

**SUPERFUND RECORD OF DECISION
FOR GROUP III IMPOUNDMENTS (1, 2, 3, 4, 5, 14, 20 & 26)**

**AMERICAN CYANAMID SITE
AMERICAN HOME PRODUCTS CORPORATION
BRIDGEWATER TOWNSHIP, SOMERSET COUNTY
NEW JERSEY**



Prepared by:
New Jersey Department of Environmental Protection
Site Remediation Program
Bureau of Federal Case Management
September 1998

RECORD OF DECISION
For
Group III Impoundments at American Cyanamid Site
Bridgewater Township, Somerset County

New Jersey Department of Environmental Protection

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Group III Impoundments (1, 2, 3, 4, 5, 14, 20, and 26) at the American Cyanamid Site
Bridgewater Township, Somerset County, New Jersey

STATEMENT OF BASIS AND PURPOSE

This decision document, prepared by the New Jersey Department of Environmental Protection (NJDEP) as lead agency, presents the selected remedy for the Group III Impoundments (1, 2, 3, 4, 5, 14, 20, and 26) at the American Cyanamid Site. The selected remedy was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Re-authorization Act of 1986 (SARA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the factual and legal basis for selecting the remedy for the Group III Impoundments at this site and is based on the administrative record. The attached index identifies the items that comprise the administrative record. The United States Environmental Protection Agency (EPA), support agency for this site, concurs with the selected remedy, indicated by the signature of the Regional Administrator at the end of this declaration statement.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to human health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

This ROD addresses only Group III Impoundments consisting of eight on-site surface Impoundments 1, 2, 3, 4, 5, 14, 20, and 26. The selected remedy is as follows:

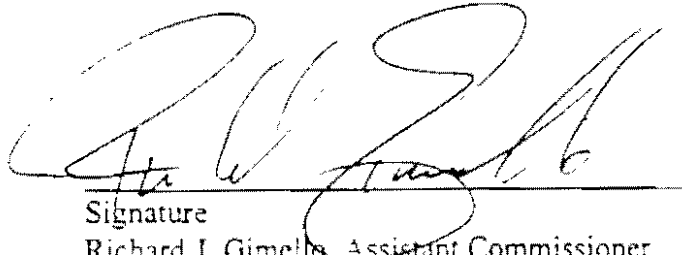
- Category A material (High BTU tar of Impoundments 1 and 2)--Low-Temperature Thermal Treatment (LTTT) and placement of treated material in Impoundment 8;
- Category B (Low BTU tar of Impoundments {4, 5 (wet), 14, and 20})--Biotreatment and placement of treated material in Impoundment 8;
- Category C (remaining tar material of Impoundment 3)--LTTT and placement of treated material in Impoundment 8;
- Category D (non-hazardous material of Impoundments 5 (dry) and 26 Consolidation in Impoundment 8; and
- Category E (General plant debris of Impoundments 3, 4, 5, 14, and 20) Consolidation in Impoundment 8.

DECLARATION OF STATUTORY DETERMINATIONS

The remedy, as described above, for the Group III Impoundments has been selected based on the results of the Impoundments Characterization Program, Baseline Endangerment Assessment and the Corrective Measure Study/Feasibility Study (CMS/FS) for Group III Impoundments, which have shown the remedy to be protective of human health and the environment. The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site.

Because this remedy will result in hazardous substances remaining on the site, a review will be conducted pursuant to CERCLA every five (5) years after the commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

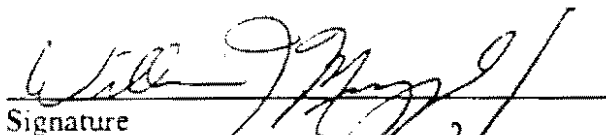
This Record of Decision fulfills the requirements of 40 CFR Part 124 for a Hazardous and Solid Waste Amendment (HSWA) permit renewal for impoundments 1, 2, 3, 4, 5, 14, 20, and 26.



Signature

Richard J. Gimello, Assistant Commissioner
Site Remediation Program
New Jersey Department of Environmental Protection

10/5/98
Date



Signature

Jeanne M. Fox, Regional Administrator
United States Environmental Protection Agency

9/28/98
Date

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SITE NAME, LOCATION, AND DESCRIPTION

American Cyanamid Company's (Cyanamid's) Bound Brook facility is located in north central New Jersey in the southeastern section of Bridgewater Township, Somerset County. The facility encompasses approximately 575 acres and is bounded by Route 28 to the north, the Raritan River to the south, Interstate 287 and the Somerset Tire Service property to the east, and Foothill Road and the Raritan River to the west. A site map identifying important features of the site with a highlight of the Group III Impoundments is attached (Figure 1).

SITE HISTORY AND ENFORCEMENT ACTIVITIES

Throughout its more than 75-year manufacturing history, numerous organic and inorganic chemical raw materials were used at the Cyanamid facility to produce products including rubber chemicals, pharmaceuticals, dyes, pigments, chemical intermediates, and petroleum-based products. Currently, only pharmaceuticals are being manufactured at the site.

Preliminary investigations completed by Cyanamid in 1981 verified that approximately one-half of the site never supported manufacturing, waste storage, or waste disposal activities and that contamination source areas are confined primarily to the main plant area (including the production area and West Yard) and the on-site waste storage impoundments. Most of the wastes generated from past manufacturing operations were stored in the on-site surface impoundments, while general plant wastes, debris, and other materials were primarily disposed of on the ground at various locations in the West Yard. The impoundments and contaminated soils are the primary focus of current remedial investigation efforts because they constitute sources contributing to ground water contamination.

While a total of 27 impoundments exist at the Cyanamid facility, 16 of these were determined through investigative efforts to be potentially contributing to ground water contamination and are being addressed under CERCLA. These 16 impoundments include Impoundments 1, 2, 3, 4, 5, 11, 13, 14, 15, 16, 17, 18, 19, 20, 24, and 26. The other 11 impoundments (Impoundments 6, 7, 8, 9, 9A, 10, 12, 21, 22, 23, and 25) were either never used (Impoundments 9, 10, and 12), contain only river silt from the facility's former river water treatment plant (Impoundments 22 and 23), contain emergency fire water (Impoundment 21), have been closed with NJDEP approval (Impoundment 25, in 1988) or are being closed in accordance with approved Resource Conservation and Recovery Act (RCRA) closure plans (Impoundments 6, 7, 8, and 9A). Impoundments 6, 7, 8, and 9A are being closed under RCRA because they were classified under RCRA as Treatment/Storage/Disposal (TSD) facilities. Closure procedures under RCRA were implemented for Impoundments 6, 7, 8, and 9A after the use of Impoundments 6 and 7 was discontinued in 1984 and interim TSD status expired. Impoundment 9A has been closed in-place. The 16 Impoundments being addressed under this Superfund cleanup program were never given interim status as TSD facilities under RCRA. The 16 impoundments potentially contributing to ground water contamination were used for storing by-products of rubber chemical production, dye production, and coal tar distillation as well as for disposal of general plant waste and demolition debris. These 16 impoundments contain a total of approximately 877,000 tons of waste material.

On June 8, 1981, Cyanamid filed a general notification of release of hazardous substances with the EPA. In December 1982, the entire Cyanamid facility was listed on the National Priorities List (NPL) of Superfund sites.

Cyanamid and the NJDEP entered into an Administrative Consent order (ACO) in May 1988 to address the 16 on-site impoundments, site-wide contaminated soils, and ground water. In addition to the regulatory requirements established under the ACO, a New Jersey Pollutant Discharge Elimination System/Discharge to Ground Water (NJPDES/DGW) permit number 0002313 was also issued. This permit, which was issued to Cyanamid in 1987, required that Cyanamid conduct extensive ground water monitoring on a quarterly basis and continue pumping three bedrock production wells, at a minimum rate of 650,000 gallons per day, to contain ground water contamination within the production area and West Yard area of the site.

In May 1994, Cyanamid and NJDEP executed an ACO Amendment (1994 ACO Amendment) which incorporated the existing site-wide ground water pumping and monitoring requirements of the NJPDES/DGW permit, including the ground water monitoring requirements for the on-site Impoundment 8 facility (Impound 8 Facility). The 1994 ACO amendments supplement the 1988 ACO. The RCRA operating permit (NJPDES/DGW permit issued under the state's federally authorized program) for the Impoundment 8 Facility was not renewed. The current NJPDES/DGW permit includes only closure and post-closure requirements for Impoundment 8 Facility. Site-wide ground water monitoring will continue to be performed pursuant to the requirements of the 1994 ACO Amendment. In accordance with the 1994 ACO Amendment, Cyanamid will continue to pump, at a minimum, 650,000 gallons per day from production wells PW2 and PW3, installed in 1993 and located in the main plant area. Former production wells PW16, PW17, and PW18 located on the Hill Property have been converted into monitoring wells.

In November 1988, EPA issued the HSWA Permit that, in conjunction with the operating permit issued by NJDEP, constitutes the RCRA permit for the Cyanamid facility. The HSWA Permit was modified (effective March 4, 1994) to incorporate the selected remedy for the Group I Impoundments (11, 13, 19, and 24). The HSWA Permit is consistent with the ACO, the NJPDES permit and the 1994 ACO Amendment.

In December 1994, American Home Products Corporation purchased American Cyanamid Company and assumed full responsibility for environmental remediation as required under the ACO for this site.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Impoundment Characterization Program Final Report (ICPFR), Baseline Site-Wide Endangerment Assessment Report (Baseline EA), Corrective Measure Study/Feasibility Study (CMS/FS), and the Proposed Plan for the Group III Impoundments at the American Cyanamid Site were released to the public for comment on April 22, 1998. The public comment period extended from April 22, 1998 to June 5, 1998 to provide interested parties the opportunity to comment. These documents were made available to the public in the administrative record files at the EPA Docket Room in Region II, 290 Broadway, New York, New York and in the

administrative record index at New Jersey Department of Environmental Protection, 401 East State Street, Trenton, New Jersey. In addition, these documents were placed at information repositories at the Bridgewater Town Hall, 700 Garretson Road, Bridgewater, New Jersey and the Somerset County/Bridgewater Library, North Bridge Street and Vogt Drive, Bridgewater, New Jersey. The notice of availability for the above-referenced documents was published in the Courier News on April 22, 1998.

During the comment period, NJDEP and EPA held a public meeting/public hearing on May 21, 1998 at the Bridgewater Township Municipal Court to discuss and respond to any questions from area residents and other attendees in regards to the results of the ICPFR, Baseline EA and the CMS/FS and to present the preferred remedy. This public comment period and meeting fulfills the public participation responsibilities of the Hazardous and Solid Waste Amendments of 1984 (HSWA) and 40 CFR Part 124 for a HSWA permit renewal.

Responses to the comments received at the public meeting, and in writing during the public comment period, are included in the Responsiveness Summary section of this Record of Decision.

SCOPE AND ROLE OF RESPONSE ACTION

This ROD addresses the remediation of the Group III Impoundments only. There is a potential future risk to human health and the environment if the Group III Impoundments are not remediated. The Group III Impoundments are a continuous source of ground water contamination with contaminants detected above the State and Federal ARARs. The ground water in the vicinity of the site is classified as a source of drinking water. Although there is a pumping program to control migration of contaminated ground water by a recovery of 650,000 gallons per day of contaminated ground water, the population around the site could potentially be exposed to contaminated ground water under a future use scenario. Finally, the Group II Impoundments may pose an ecological risk at the site if left unremediated. For these reasons, remediation of the Group III Impoundments is warranted.

A Remedial Investigation of the site-wide soils was completed in 1992. A Feasibility Study addressing the site-wide soils will be initiated after completion of the remediation of the 16 on-site impoundments. Site-wide ground water contamination will be addressed after completion of the remediation of site-wide soils. Potential contamination in surface water, sediment and associated wetlands related to the Cuckolds Brook and Raritan River is being independently (and simultaneously with this program) addressed under the Natural Resource Assessment investigation program. Depending upon the outcome of this investigation program, additional study and/or restoration work may be required.

SUMMARY OF SITE CHARACTERISTICS

There are two ground water aquifer systems which underlie the site: a shallow overburden aquifer system (flow direction to the south towards the Raritan River) and a deeper, semi-confined bedrock aquifer system (flow direction towards the north due to the production wells).

Any ground water that is not captured by the ongoing pumping system flows to the Raritan River. A previous study (Lawler, Matuskey, and Skelley, 1983) concluded that the Cyanamid facility did not have a significant impact on water quality in the Raritan River upstream of the Calco Dam and above the Cuckolds Brook discharge to the river.

Due to practical limitations, all 16 of the Superfund impoundments cannot be remediated concurrently. Therefore, they have been grouped into three impoundment groups according to waste type, nature of contaminants, and geographical location on the site. This concept allows this complex site to be subdivided into discrete, more manageable units. The impoundment groups are as follows:

Group I - Impoundments 11, 13, 19, and 24

Group II - Impoundments 15, 16, 17, and 18

Group III - Impoundments 1, 2, 3, 4, 5, 14, 20, and 26

This ROD addresses the remediation of the Group III Impoundments only. Remediation of the site-wide soils and ground water will be addressed in separate subsequent CMS/FS reports to be completed in accordance with the schedules set forth in the May 1988 ACO (Amended May 1994).

Completed Programs

American Home Products Corporation has completed, or is conducting, several remedial programs at the site. Completed programs include: removal of pumpable tars (3.1 million gallons) from Impoundment 2 for off-site use as a supplemental fuel (1986-1987); removal of pumpable tars from Impoundment 1 (1960s); a berm stability evaluation program (1989); and a remedial investigation of the Hill Property. Each of the ongoing programs is discussed briefly below.

On-going Programs

Impoundments 4, 5, and 14 Fuel Blending Program

Cyanamid has performed an interim remedial action (IRA) on Impoundments 4 and 5 by pumping/removing the tars, blending and/or containerizing them on the site and shipping them offsite for use as a supplemental fuel in a cement kiln process. These impoundments contained approximately 5,000,000 gallons of pumpable tars, that when blended together, produced a fuel product that could be used in off-site cement kilns as a supplemental fuel. A blending process was designed and installed for heating and blending these tars for loading into tank wagons. Operation began in July 1991 and through October 1994 approximately 3,800,000 gallons of tars were successfully removed, blended and shipped offsite from these impoundments. This system has been shut down since October 1994, after removal of all pumpable material. An alternative approach for the removal of residual tars in Impoundments 4 and 14, by excavation and shipment in sealed containers for off-site blending to produce a fuel product, is currently being pursued. The CMS/FS for the Group III Impoundments addresses the existing material of Impoundments

4 and 14. If the alternate removal approach is successful, the residuals will be addressed as part of Remedial Design for the Group III Impoundments.

On-site Impoundment 8 Facility Program

This program involves closure and post-closure of four on-site impoundments (Impoundments 6, 7, 8, and 9A) and the construction of a waste consolidation facility (Impoundment 8 facility). These construction, closure, and post-closure activities are being conducted in accordance with the May 1994 ACO. Construction of Cell 1 of the state-of-the-art Impound 8 facility was completed in May 1991. The design includes a triple liner, leachate detection and collection system and ground water monitoring system. A cross section of the Impound 8 facility is provided (Figure 2). Sludge from old Impoundment 8 was removed, dewatered, solidified, and consolidated into Cell 1 from August 1991 to November 1994. Also during this time period, most of the waste from Impoundment 7 was removed, dewatered, solidified, and consolidated into Cell 1. Impoundment 19 remediation commenced in October 1994 and was completed in June 1995. The solidified sludge from Impoundment 19 was placed in Cell 1. Construction of Cell 2 of the Impound 8 facility was completed in August 1996. The design of this cell includes a double composite liner system, leachate detection and collection system, and a ground water monitoring system. Solidified sludge from the remediation of Impoundment 11 was placed in Cell 2 between September 1996 and April 1997. Waste from Impoundment 6 is currently being solidified and consolidated into Cell 2. This activity is expected to be completed in the summer of 1998. Cells 3 and 4 of the Impound 8 facility are scheduled for construction following the remediation of Impoundment 6. The design of these cells will be similar to Cells 1 and 2. After completion of the cells construction, remediation of the remaining Group I Impoundments (13 and 24) and other impoundments involving consolidation into the Impound 8 facility will begin. This project will continue for eight to ten years. Impoundment 9A has been closed in-place by installing a double synthetic liner capping system (60-mil High Density Polyethylene).

Surface Soils Remedial/Removal Action Program

The 1992 Surface Soils Remedial/Removal Action (SSR/RA) Program was completed in December 1992 addressing areas of surface soil contamination that posed a potential risk to worker health and safety. The program included excavation and off-site disposal of Polychlorinated Biphenyl (PCB)-contaminated soils, excavation and disposal of Polynuclear Aromatic Hydrocarbon (PAH)-contaminated soil in the on-site RCRA permitted facility, and capping of another PAH-contaminated area (in West Yard Area near Impoundment 14), as well as placement of a geotextile, soil and vegetative cover over a chromium-contaminated area. These areas, except for one PAH Area (Area 11) will be revisited as part of the site-wide soil remediation program. PAH Area 11 was determined to be clean based on post-excavation sampling results that indicated no surface contamination and based on the Soil Remedial Investigation data that indicated no subsurface contamination above the applicable State Cleanup Criteria. NJDEP non-residential cleanup criteria were used in the SSR/RA program.

Impoundments 11, 13, 19, and 24 (Group I)

Remediation of the Group I Impoundments, consisting of solidification and consolidation into the Impoundment 8 facility, has been initiated in accordance with the September 1993 Record of Decision (ROD), May 1994 Remedial Design Report as well as the July and September 1994 Impoundment 19 Remedial Action Plans and the August 1996 Impoundment 11 Remedial Action Plan. To date, remediation of Impoundments 19 and 11 has been completed. Remediation of Impoundments 13 and 24 will be initiated after completion of the remediation of the Group II and III Impoundments.

Impoundments 15, 16, 17, and 18 (Group II)

Remediation of the Group II Impoundments has been initiated in accordance with the July 1996 ROD, the March 1997 Remedial Design Report, and the October 1997 Remedial Action Plan (Impoundment 18). The selected remedial alternatives for those impoundments are as follows:

Impoundment 15 and 16: Consolidation of the material from Impoundment 16 into Impoundment 15, followed by covering with a synthetically lined cap; American Home Products Corporation is pursuing an alternative remedy consisting of recycling, pending negotiations with a recycling vendor.

Impoundment 17: Solidification and consolidation into the Impound 8 facility. Remediation of Impoundment 17 will be initiated after completion of the remediation of the Group III Impoundments (because of the high concentrations of detected contaminants in the Group III Impoundments).

Impoundment 18: Security fencing, berm improvements and maintenance of natural vegetative cover.

To date, the closure of Impoundment 18 has been completed.

Hill Property Remedial Investigation/Rod

The Hill Property is approximately 140 acres in area, bounded to the south by the Central Railroad of New Jersey (CRNJ) railroad tracks, to the east by Interstate Highway 287, to the north by Route 28 (Union Avenue), and to the west by Foothill Road (Figure 1). The Hill Property is bisected by Main Street and encompasses a small traffic circle where Van Horne Avenue and Main Street intersect. Although physically separated from the main plant of the site the Hill property portion is part of the overall site, which consisted of a research laboratory and administrative buildings. The March 1991 Hill Property Remedial Investigation Report and comparison of contaminant levels in soils to NJDEP Soil Cleanup Criteria have indicated that levels of contaminants in soils at the Hill Property are below the applicable NJDEP Soil Cleanup Criteria (both residential and non-residential) and/or background and/or Impact to Ground Water Criteria. The March 1992 Baseline Site-Wide Endangerment Assessment Report (Hill Property

Quantitative Risk Assessment, Appendix VII) established that there is no current or future unacceptable risks to human health and the environment associated with the Hill Property. Based on this finding, no remedial actions are required for the Hill Property soils.

In July of 1996, a no further action ROD was issued by the NJDEP for the Hill Property portion of the site. The ROD includes provisions for a Classification Exception Area (CEA) covering the ground water beneath the Hill Property. This ground water is monitored at five bedrock wells (former production wells PW-16, PW-17, PW-18, as well as wells UU and MJ). Low levels of some organic compounds were observed in these wells at the time of issuing of the ROD/CEA. Monitoring of these wells is required, in accordance with the ACO Amendment and the ROD/CEA, until it is observed that the monitoring results are below criteria for two consecutive quarters (NJAC 7:26E-6.3). NJDEP approved a request to terminate monitoring for wells PW17, PW18, UU and MJ on February 18, 1998 based on the information submitted in the January 1998 Hill Property Ground Water Quality Assessment report. Monitoring of well PW16 will continue until such time that the monitoring data meet the conditions discussed above in this section.

Bedrock Ground Water Pumping/Control System Program

For the past 60 years, Cyanamid has withdrawn water from the on-site bedrock production wells for use as non-contact cooling water in the production operations. Cyanamid's present average withdrawal of over 650,000 gallons per day results in ground water flow inward from the perimeter of the site towards the pumping wells. This system effectively contains the majority of the ground water contamination within the production area and West Yard area on the site. Recovered ground water is used as non-contact cooling water on-site before discharge to the adjacent Somerset-Raritan Valley Sewerage Authority (SRVSA) wastewater facility for subsequent treatment. Any ground water not captured by the production well pumping system flows to the Raritan River. A previous study (Lawler, Matuskey, and Skelley, 1983) concluded that the Cyanamid facility did not have a significant impact on water quality in the Raritan River. Further study of the Raritan River/Cuckolds Brook water quality was conducted as part of the NRA. The NRA is currently under evaluation as stated earlier.

Group III Impoundments Characterization

The Group III Impoundments were characterized as reported in the January 1990 ICPFR. A summary of the analytical results of the contents of the Group III Impoundments, based on the original ICPFR, is provided in Table 1. The locations of the impoundments are indicated as the shaded areas on Figure 1.

Further characterization was conducted as part of the Pilot -Scale Treatability Studies (Pilot Studies) completed in late 1995 - early 1996. The characterization data are consistent with the results of the ICPFR. In the Pilot Studies, forty organic compounds were detected in the Group III impoundments. Of these, 8 compounds were considered predominant, as they accounted for over 95% of the total mass of detected compounds in Group III impoundment material. The

detected predominant compounds are as follows: benzene, toluene, xylenes, naphthalene, nitrobenzene, 1,2-dichlorobenzene, n-nitrosodiphenylamine, and 2-methylnaphthalene. A more detailed characterization of the Group III Impoundments is presented below, with predominant organic compounds selected on the basis of the Pilot Studies.

Group III Impoundments were classified as non-hazardous in 1990 using then applicable criteria: Reactivity, Corrosivity, Ignitability and EP Toxicity. EP Toxicity criteria were replaced by Toxicity Characteristics Leaching Procedure (TCLP) criteria in March 1990. Based on the evaluation performed of the existing analytical data for the material of Impoundments 5 (Dry) and 26, it was determined that it would not be RCRA hazardous if tested under the TCLP, because contaminant levels are below regulatory guidelines. Appendix II of Part 261 of the TC Final Rule states "If a total analysis of the waste demonstrates that the individual contaminants are not present in the waste, or that they are present at such low concentrations that the appropriate regulatory threshold could not be exceeded, the TCLP need not be run". Such evaluation for the remaining Group III Impoundments {1, 2, 3, 4, 5 (wet), 14, and 20} was not performed. In absence of a TCLP evaluation, Impoundments 1, 2, 3, 4, 5 (Wet), 14 and 20 will be handled and managed as hazardous.

Impoundment 1

Impoundment 1 has a surface area of approximately 2.1 acres. It was constructed in 1956 and used until 1965 for the storage of sludge from the coal oil refining process. Between 1966 and 1967, the top layer of Impoundment 1, consisting of a light oil sludge (LOS) material was removed, leaving only the more viscous layers. The remaining viscous material in Impoundment 1 forms two distinct layers: an upper viscous, rubbery (VR) tar layer and a lower layer of hard crumbly (HC) tar. Impoundment 1 contains approximately 6500 yd³ of the VR layer at an estimated depth of 0 to 3 feet and approximately 13,000 yd³ of the HC layer at an estimated depth of 3 to 8 feet. In the 1980s, coal aggregate was deposited into Impoundment 1 to facilitate the excavation of material for an off site fuel blending program. This program was unsuccessful, and coal deposits remain in the impoundment. Impoundment 1 is covered with a synthetic liner for odor control. The pH of Impoundment 1 material is less than 1 Standard Unit (SU). The detected predominant volatile organic compounds (VOCs) range in maximum concentration from 10,000 parts per million (ppm) to 270,000 ppm and are benzene, toluene and total xylene. The detected predominant semivolatile organic compounds range in maximum concentration from 1,500 ppm to 6,500 ppm and are 1,2-dichlorobenzene, naphthalene and nitrobenzene. The detected inorganic compounds range in maximum concentration from 1.0 ppm to 100 ppm and include arsenic, barium, chromium, copper, lead, mercury, nickel, selenium, silver and zinc.

Impoundment 2

Impoundment 2 has a surface area of approximately 2.3 acres. Impoundment 2 was constructed in 1947 and was used until 1956 for the storage of sludge from the coal oil refining process. Between 1986 and 1987, the top layer of Impoundment 2, consisting of LOS, was removed, leaving non pumpable sludge. The remaining material in Impoundment 2 forms two distinct

layers: an upper VR tar layer and a lower layer of HC tar. Impoundment 2 contains approximately 12,000 yd³ of the VR layer at an estimated depth of 0 to 4 feet and approximately 12,000 yd³ of the HC layer at an estimated depth of 4 to 9 feet. A water cover is maintained over Impoundment 2 for odor control. The pH of Impoundment 2 is less than 1 SU.

The detected predominant volatile compounds range in maximum concentration from 22,000 ppm to 87,000 ppm and are benzene and toluene. The detected predominant semi-volatile organic compounds range in average concentration from 5,200 to 11,000 ppm and are 1,2-dichlorobenzene and naphthalene. The detected inorganic compounds range in concentration from 2.6 ppm to 127 ppm and are chromium, copper, lead, mercury, nickel, selenium and zinc.

Impoundment 3

Impoundment 3 has a surface area of approximately 1.3 acres, and varies in depth from 14 to 18 feet. It was constructed in 1943 and used until 1975. It was initially used for the storage of organic tars from the distillation of coal oil. Construction material, general plant debris, and fill material were also consolidated into the impoundment at a later time, resulting in an area that is three quarters covered with fill/soil. Some of the plant material included sludge generated by the former dyes/pigments operations conducted at the facility. The impoundment contains a total of approximately 21,000 yd³ of well-mixed organic tar, fill material, and general plant debris.

The detected predominant volatile organic compounds are benzene, toluene and xylene. The maximum concentration of detected predominant volatile compounds range between 160 ppm to 1,000 ppm. The detected predominant semi-volatile compounds are naphthalene, n-nitrosodiphenylamine, 2-methylnaphthalene, 1,2-dichlorobenzene and nitrobenzene, and they range in maximum concentration from 290 ppm to 890 ppm. The detected inorganic compounds range in maximum concentration from 2 ppm to 4,480 ppm and are antimony, arsenic, barium, beryllium, cadmium, chromium, copper, cyanide, lead, mercury, nickel, selenium, silver, vanadium and zinc.

Impoundment 4

Impoundment 4 has a surface area of 1 acre. It was constructed in 1943 and operated until 1975. It was used to store organic tars from various production processes. It originally contained 13,500 yd³ of a stringy tacky tar that increased in viscosity with depth. The Fuel Blending/Recycling program was successful in removing 12,500 yd³ of the material, so that this impoundment now contains only about 1,000 yd³. The surface of Impoundment 4 is covered by an aqueous layer attributable to rainfall.

The detected predominant volatile organic compounds range in maximum concentration from 6,100 ppm to 20,000 ppm and are benzene, toluene, and xylene. The detected predominant semivolatile organic compounds range in maximum concentration from 1,300 ppm to 20,000 ppm, and are n-nitrosodiphenylamine, naphthalene, 2-methylnaphthalene, 1,2-dichlorobenzene and nitrobenzene. The detected inorganic compounds range in maximum concentration from

0.87 ppm to 101 ppm and are arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc.

Impoundment 5

Impoundment 5 was constructed in 1943 and used until 1975. This impoundment has an approximate surface area of 7.7 acres and an average depth of 12 feet. It was initially used for the storage of sludge resulting from on-site manufacturing processes, and later for storage of organic tars, also generated from manufacturing activities on-site. In the 1960s and 1970s, fill material, general plant material, drums, and construction material were also added. The filling activities resulted in the impoundment becoming divided, almost equally, into a "wet" (eastern) and "dry" (western) area. The dry area is made up of solid fill material and the wet area of tars and sludge. The sludge underlies the fill material and thus covers the entire floor of the impoundment, not just the "wet" area. The total original volume of waste in this impoundment was 116,500 yd³. The fuel blending program was successful in removing 6,200 yd³ of tar and sludge material. 110,300 yd³ of material remain in Impoundment 5.

The detected predominant volatile compounds range in maximum concentration from 28,000 ppm to 82,000 ppm, and are benzene, toluene and xylene. The detected predominant semivolatile organic compounds range in maximum concentration from 8,100 ppm to 420,000 ppm, and are n-nitrosodiphenylamine, naphthalene, 2-methyl naphthalene, and 1,2-dichlorobenzene. Inorganic compounds were analyzed separately in the fill material and the sludge. The detected inorganic compounds are antimony, arsenic, barium, beryllium, cadmium, chromium, copper, cyanide, lead, mercury, nickel, selenium, silver, vanadium, zinc. In the sludge, the detected inorganic compounds range in maximum concentration from 1.6 ppm to 7,480 ppm. In the fill material the detected inorganic compounds range in maximum concentration from 0.85 ppm to 2,130 ppm.

Impoundment 14

Impoundment 14 was constructed in 1954 and operated until 1958. It was used for the storage of organic tars. Sludge and general plant debris were disposed of in the impoundment at a later time. It has a surface area of approximately 0.9 acre, is 4 to 5 feet deep, and contains approximately 5000 yd³ of a mixture of stringy organic tar, organic sludge, and general solid wastes. A water layer covers the surface of the impoundment and varies in depth with rainfall.

The detected predominant volatile organic compounds range in maximum concentration from 1,300 ppm to 3,200 ppm, and are benzene, toluene, and xylene. The detected predominant semivolatile compounds range in maximum concentration from 1,600 ppm to 7,800 ppm, and are n-nitrosodiphenylamine, naphthalene, 2-methyl naphthalene, and 1,2-dichlorobenzene. The detected inorganic compounds range in maximum concentration from 0.3 ppm to 810 ppm, and are antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver and zinc.

Impoundment 20

Impoundment 20 was constructed in the early 1950s and used until 1980 as a settling basin for the on-site treatment of wastewater generated from former dye and pigment operations. In 1986, the contents of Impoundment 20 were subjected to a partial in-situ solidification process using a mixture of cement kiln dust and Portland cement. After in-situ solidification was completed, the surface of the impoundment was covered with a 6-mil synthetic liner and graded with approximately 1 foot of clean fill. This impoundment is approximately 1 acre in area and contains 7,800 yd³ of a sludge/cement/kiln dust blend with an average depth of about 6.5 feet. The material in the impoundment is fairly homogeneous, with some variation in consistency due to incomplete mixing that apparently occurred during the in-situ solidification process.

The detected predominant volatile organic compounds range in maximum concentration from 2,900 ppm to 5,500 ppm and are benzene, toluene and xylene. The detected predominant semivolatile organic compounds range in maximum concentration from 55 ppm to 1,236 ppm, and are n-nitrosodiphenylamine, naphthalene, 2-methyl naphthalene, and 1,2-dichlorobenzene. The detected inorganic chemicals range in maximum concentration from 1.18 ppm to 148,000 ppm and are antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, cyanide, mercury, nickel, selenium, silver, vanadium and zinc.

Impoundment 26

Impoundment 26 was constructed in 1943 and used until 1955 for the storage of organic tars. It was later filled with construction material, general plant material and fill material. Impoundment 26 is 1.3 acres in surface area and has an average depth of 14 feet, and contains approximately 22,000 yd³ of tar mixed with fill material. About two-thirds of the surface of this impoundment is fill material, while the remainder consists of organic tar material mixed with general solid wastes and plant waste. The majority of the impounded tar is hard and brittle, and it is often found in various sized chunks.

The detected predominant volatile organic compounds range in maximum concentration from 330 ppm to 1,400 ppm, and are benzene, toluene and xylene. The detected predominant semivolatile organic compounds range in maximum concentration from 170 ppm to 660 ppm and are n-nitrosodiphenylamine, naphthalene, 2-methyl naphthalene, and 1,2-dichlorobenzene. The detected inorganic compounds range in maximum concentration from 0.6 ppm to 38,200 ppm, and are antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver and zinc.

Designation of Impound 8 Facility as Corrective Action Management Unit

EPA has designated Impound 8 as a Corrective Action Management Unit (CAMU) in accordance with the regulations promulgated on February 16, 1993 under the authority of sections 1006, 2002(a), 3004(u), 3004(v), 3005(c), 3007 and 3008(h) of the Solid Waste Disposal Act as amended by the RCRA, as amended by the HSWA of 1984. Impound 8 meets the minimum

criteria as specified in the regulations for CAMU, detailed description of which is provided in the May 8, 1996 petition to EPA by American Home Products Corporation. Designation of Impound 8 as a CAMU will allow consolidation of the residual waste of the Group III Impoundments. Categories A, B and C material of the Group III Impoundments will be treated to the levels specified in Table 2 prior to consolidation into Impound 8. Material of Categories D and E will be conditioned to meet the placement requirements (strength and physical compatibility) of the Impound 8 Facility. This CAMU designation of Impound 8 is for consolidation of the Group III Impoundments material. Consolidation of any other future site material will require establishment of specific treatment levels related to that material.

SUMMARY OF SITE RISKS

Based upon the results of the ICPFR, the Baseline EA was completed to estimate the risks associated with current site conditions. The Baseline EA estimates the human health and ecological risks presented by the contamination at the site if no remedial actions were taken. The results of the Baseline EA were reported in March 1992.

Human Health Risk Assessment

A four-step process is utilized for assessing site-related human health risks for a reasonable maximum exposure scenario: Hazard Identification--identifies the contaminants of concern at the site, based on several factors such as toxicity, frequency of occurrence, and detected levels. Exposure Assessment--estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures and the pathways (e.g., ingesting contaminated well-water) by which humans are potentially exposed. Toxicity Assessment--determines the types of adverse health effects associated with chemical exposures and the relationship between magnitude of exposure (dose) and severity of adverse effects (response). Risk Characterization--summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative (e.g., one-in-a-million excess cancer risk) assessment of site-related risks.

As a first step in the Baseline EA, contaminants of concern were selected that would be representative of site risks. The contaminant selection criteria were based primarily on frequency of detection, the availability of toxicity criteria, and numerical threshold criteria. The Baseline EA identified a total of 55 contaminants of concern for the Cyanamid site. Of these 55 contaminants, those that were detected most frequently or in the highest concentrations within the Group III Impoundments are naphthalene, benzene, 2-methyl naphthalene, toluene, xylene (total), 1,2-dichlorobenzene, n-nitrosodiphenylamine, nitrobenzene, arsenic, cadmium, barium, chromium, lead, mercury, nickel, selenium, silver and zinc. Of the frequently detected contaminants of concern, benzene, n-nitrosodiphenylamine, arsenic, cadmium, chromium, nickel and lead are known or suspected carcinogens according to the EPA Carcinogen Assessment Group (CAG) classification system.

Using the Baseline EA evaluation for exposure pathways for on-site and off-site human receptors, a number of significant exposure pathways were identified and evaluated quantitatively to determine the risk levels presented by existing site conditions.

Exposure to contaminated ground water was not identified as a significant exposure pathway at the present time because the facility pumps 650,000 gallons per day of ground water from on-site production wells that contain ground water contamination in the production area and west yard area of the site. Ground water not being captured by the production well pumping flows to the Raritan River at a point that is not being used as a drinking water source. Therefore, a ground water exposure pathway does not exist at the present time.

Summary of Human Health Risks

Through an assessment of exposure pathways for the 55 contaminants of concern, specific health risk levels were calculated for each significant exposure pathway to enable a quantitative evaluation of health risks for human receptors.

Current federal guidelines for acceptable exposures are individual lifetime excess carcinogenic risk in the approximate range of 1×10^{-4} to 1×10^{-6} . This can be interpreted to mean that an individual may have a one in 10,000 to a one in 1,000,000 increased chance of developing cancer as a result of a site-related exposure to a carcinogen under specific exposure conditions. Current federal guidelines for acceptable exposures for non-carcinogenic risk allow a maximum Hazard Index of 1.0. The Hazard Index is defined as the sum of the Hazard Quotients for all contaminants of concern within a particular exposure pathway that have a similar mechanism of action or end point. A Hazard Quotient greater than 1.0 indicates that the exposure level exceeds the protective level for that particular chemical.

The New Jersey Public Law P.L. 1993, c. 139 (NJSA 58:10B) has set the acceptable cancer risk for human carcinogens at 1×10^{-6} (one-in-one-million) and acceptable non-carcinogenic risk for any given effect to a value not to exceed a Hazard Index of 1.0. These established acceptable risk values are for any particular contaminant and not for the cumulative effects of more than one contaminant at a site.

The Baseline Endangerment Assessment, which was approved by NJDEP and EPA in 1992, provided an overall assessment of the potential human health and environmental risks posed by existing site conditions. A quantitative risk assessment was completed for affected media for which a complete human exposure pathway exists. A qualitative ecological assessment was also conducted to evaluate potential exposure pathways. As detailed in the Baseline Endangerment Assessment, only Impoundments 1 and 2 of the Group III Impoundments were identified as having complete exposure pathways through which potential receptor contact could result in unacceptable risks.

In the Baseline Endangerment Assessment, potential risks were evaluated based on an integrated analysis of three factors: contaminant concentration, toxicity, and exposure potential. In order

for an exposure event to occur, a complete exposure pathway would be required. A complete exposure pathway would consist of a contaminant source and release mechanism, a retention or transport medium, a point of potential receptor contact with the contaminated medium, and an exposure route (e.g., ingestion or inhalation) at the contact point. Based on the findings of the Baseline Endangerment Assessment, the Group III Impoundments 3, 4, 5, 14, 20, and 26 do not pose an unacceptable risk to receptor populations identified in their current state. This conclusion is based on the following: Impoundments 3, 4, 5, 14, 20, and 26 are located within a secure operating facility (fenced and guarded), remote from potential off-site receptor populations; the bedrock ground water from the Group III Impoundments area is captured by the on-site pumping wells; and dust or volatile emissions from the Group III Impoundments do not have significant potential to reach receptor populations at concentrations that could impact human health or the environment.

However, the Baseline Endangerment Assessment calculated the volatile emissions from Impoundments 1 and 2 exclusively, because these impoundments contained significantly higher concentrations of volatile compounds than any other impoundment. A water cover is maintained on Impoundment 2 and a liner is maintained on Impoundment 1 to control the volatile emissions. Based on the calculations in the Baseline Endangerment Assessment, the potential cancer risk associated with emissions from Impoundments 1 and 2 for off-site receptors was calculated to be 2.4×10^{-6} , slightly above the 1×10^{-6} risk guideline.

While the Baseline Endangerment Assessment concluded there was limited potential for direct contact with the material in the Group III Impoundments, this material is a continuous source of ground water contamination. Ground water in the vicinity of the site is classified as 2A, which is defined as a potential source of drinking water, although it is not used as drinking water. Exposure to impacted ground water under a future ground water use scenario is a potential exposure pathway.

Qualitative Ecological Risk Assessment

In the Ecological Assessment, a reasonable maximum environmental exposure is evaluated utilizing a four step process for assessing site-related ecological risks. These steps are: Problem Formulation--development of the objectives and scope of the ecological assessment; description of the site and ecosystems that may be impacted; identification of contaminants of concern. Exposure Assessment--identification of potential ecological receptors and exposure pathways; quantitative evaluation of exposure pathways; fate and transport mechanisms for contaminants. Ecological Effects Assessment--literature reviews, field studies, and toxicity tests, linking contaminant concentrations to effects on ecological receptors. Risk Characterization--measurement or estimation of both current and future adverse effects.

The results of the site-wide habitat survey and direct field observations were compared to the Natural Heritage Data Base (NJDEP, 1991). This assessment concluded that, with the exception of great blue heron, the on-site habitat does not support threatened or endangered species.

The most significant potential exposure pathway identified in the ecological assessment is aquatic biota exposure to Raritan River water. Based on the site ground water discharge mass-loading calculation (see Baseline EA), it was concluded that exposure to concentrations of site chemicals of interest resulting from ground water discharge is unlikely to affect the health and diversity of aquatic biota in the Raritan River.

A Natural Resource Assessment (NRA) completed by American Cyanamid is currently being evaluated by the NJDEP Office of Natural Resource Damage (ONRD) with support from the Federal Natural Resource Trustees. The NRA consists of the following: a Wetlands Assessment (using state and federal guidance); a Cultural Resources Survey (Stage IA and IB); a Flood plain Assessment; an Endangered Species Assessment; and, an assessment of the Raritan River and Cuckolds Brook. Based on its evaluation of the NRA, the ONRD, in consultation with the Federal Trustees, will determine any impacts to natural resources related to the American Cyanamid site. If this determination indicates any impacts to natural resources from the American Cyanamid site, the ONRD, in consultation with the Federal Trustees, will establish appropriate requirements for mitigation and will negotiate a financial settlement with American Home Products for any damage to the natural resources. Following appropriate public comment, the findings of the NRA along with any requirements for mitigation will be incorporated into the Remedial Design of the Group III Impoundments.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAO) are specific goals to protect human health and the environment. These objectives are based on available information and standards such as applicable or relevant and appropriate requirements (ARARs).

The remedial action objective for the Group III Impoundments is to eliminate the migration of constituents from the Group III Impoundments to air, soil, ground water and surface water at levels representing an unacceptable human health or environmental risk or resulting in exceedance of ARARs. Attainment of this objective will also reduce the risk associated with potential exposure from the contaminated material in the impoundments.

DESCRIPTION OF REMEDIAL ALTERNATIVES

CERCLA requires that each selected site remedy be: protective of human health and the environment; be cost-effective; comply with other laws; and, utilize permanent solutions, alternative treatment technologies, and resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

The CMS/FS report includes a preliminary screening of all potentially applicable technologies, followed by elimination of inappropriate or infeasible alternatives and identification of applicable technologies based solely on technical feasibility. The remaining technologies were

then developed into remedial alternatives and evaluated in detail by comparing them to CERCLA criteria.

Technologies identified as technically implementable were further evaluated with respect to effectiveness, implementability, and cost, after which a combination of technological options was selected as the remedial alternative.

To focus the development and comparison of remedial alternatives, the Group III CMS/FS categorizes the impoundment materials based on physical and chemical characteristics and material handling properties. By categorizing common materials within the Group III Impoundments, a more consistent treatment evaluation can be conducted for each material category. The categorization is also more adaptable to full scale remediation. The following is a list of material categories, and the associated impoundments, as presented in the CMS/FS:

- Category A: High BTU Tar--High BTU value tar consists of the upper and lower layers of material in Impoundments 1 and 2;
- Category B: Low BTU tar/sludge (Impoundments 4, 5(wet), 14, and 20)--Tar material consists of organic tar that is typically stringy and viscous;
- Category C: Remaining material of Impoundment 3--Tar material that consists of organic tar, and fill material that consist of dry soil other than the general plant materials;
- Category D: Non hazardous material (Impoundments 5(dry) and 26)--Material consists of tars and fill material in Impoundments 5 and 26; and
- Category E: General plant debris (Impoundments 3, 4, 5, 14, and 20)--Consists of general plant debris, whole and crushed steel drums, cloth, glass etc.

The remedial alternatives evaluated included the following:

- I. No-action (Institutional Action)
- II. Consolidation in Impound 8
- III. Low Temperature Thermal Treatment (LTTT)
- IV. Solid-phase Bioremediation
- V. On-site Incineration and Disposal
- VI. Off-site Disposal

The specific alternatives evaluated differ for each material category based on physical and chemical characteristics and material handling properties. However, the above list covers the range of alternatives evaluated for the Group III impoundments.

Several points should be noted about each of the alternatives evaluated. First, all remedial alternatives will require ground water monitoring as a component. For the alternatives that involve leaving the contaminants in place, such monitoring would be required on a long-term basis, while for the alternatives that involve removal of the contaminants, the monitoring would only be required until it can be confirmed that the removal has been effective.

With respect to costs, the total cost for each alternative reflects both capital cost to implement and operation and maintenance costs over a period ranging from 5 to 30 years. The costs of all alternatives for the Group III Impoundments included in this ROD are the same as those presented in the 1997 CMS/FS report.

With respect to remedial alternatives requiring final placement in Impoundment 8 of material Categories A, B, C and D, the final placement will achieve unconfined compressive strength requirements and Toxicity Characteristics Leaching Procedure (TCLP) limits for metals. Because of the nature of the material, remedial alternatives requiring placement in Impoundment 8 Facility of material Category E will achieve the strength criteria only.

As part of Natural Resource Assessment (NRA), State and Federal regulated wetlands were delineated at Impoundments 14 and 20. Any impacts from the selected remedial action for Impoundments 14 and 20 to these wetlands will be assessed together with any need for mitigation efforts during remedial design.

Finally, with regard to the time to implement each alternative, the estimated time frames provided reflect both the time to design and construct the remediation system. However, several of the alternatives include consolidation of treated residuals in the on-site Impound 8 facility. Consolidation of these treated residuals in Impound 8 would be implemented after completion of consolidation of treated materials from Impoundment 6, currently scheduled to be completed in 1999.

A description of each of the remedial alternatives is provided below, organized according to the categories of Group III Impoundment waste:

Note: The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison with other alternatives.

Category A: High Btu Tar

Alternative A1--No-Action (Institutional Action)

This alternative includes:

- impoundments remain in-place in current condition;
- establishment of institutional controls (environmental restrictions) and improvements to physical site access controls (additional fencing);
- long-term ground water monitoring; and
- maintenance of existing water cover/liner over Impoundments 1 and 2 to minimize VOC emissions and odors.

Total Cost: \$ 230,000

Time to Implement: 1 month

Alternative A2-- Consolidation in Impound 8

This alternative includes:

- excavation of Impoundment 1 and 2 material and underlying soils to top of ground water;
- conditioning of materials to achieve necessary unconfined compressive strength;
- transport and final placement of material in Impound 8; and
- backfilling and natural revegetation of Impoundments 1 and 2 areas.

Total Cost: \$ 20,900,000

Time to Implement: 1--2 years

Alternative A3--Low Temperature Thermal Treatment (LTTT)

This alternative includes:

- excavation of Impoundment 1 and 2 materials and underlying soils, to top of ground water;
- pretreatment to accomplish detoxification, neutralization, and reduction of organic constituents;
- processing of materials using LTTT system operated at optimal parameters determined during treatability testing;
- post-conditioning, as required;
- transport and final placement of treated material in Impound 8; and
- backfilling and natural revegetation of Impoundments 1 and 2 areas.

Total Cost: \$ 30,100,000

Time to Implement: 2--5 years

Alternative A4--On Site Incineration

This alternative includes:

- excavation of Impoundment 1 and 2 materials and underlying soils, to top of ground water;
- pre-conditioning prior to incineration;
- on site incineration;
- sampling of residual ash to confirm achievement of treatment objectives;
- post-conditioning of residual ash, as required; and
- backfilling and natural revegetation of Impoundments 1 and 2 areas.

Total Cost: \$ 40,800,000

Time to Implement: 2-- years

Category B: Low Btu TarAlternative B1--No-Action (or Limited Action)

This alternative includes:

- impoundments remain in-place in current condition;
- establishment of institutional controls (environmental restrictions) and improvements to physical site access controls (additional fencing);
- long term ground water monitoring; and
- maintenance of existing water cover over Impoundments 4, 5 (wet portion), and 14 to minimize VOC emissions and odors.

Total Cost: \$180,000

Time to Implement: 1 month

Alternative B2--Consolidation In Impound 8

This alternative includes:

- excavation, followed by separation of debris from the low Btu value materials;
- conditioning of excavated materials;
- transport and final placement of material in Impound 8; and
- final site restoration activities based on requirements for soils beneath impoundments.

Total Cost: \$ 14,000,000

Time to Implement: 1--2 years

Alternative B3--Solid Phase Bioremediation

This alternative includes:

- excavation, followed by separation of debris from low Btu value materials;
- pre-conditioning and nutrient addition;
- biological processing using modified compost or aerated pile techniques for treatment of materials;
- post-conditioning, as required;
- transport and final placement of treated material in Impound 8; and
- final site restoration activities based on requirements for soils beneath impoundments.

Total Cost: \$ 33,000,000

Time to Implement: 5--7 years

Alternative B4--Low Temperature Thermal Treatment (LTTT)

This alternative includes:

- excavation, followed by separation of debris from low Btu tar materials;
- pretreatment to accomplish detoxification, neutralization, and reduction of organic constituents;
- processing of materials using LTTT system operated at optimal parameters determined during treatability testing;
- post-conditioning, as required;
- transport and final placement of treated material in Impound 8; and
- final site restoration activities based on requirements for soils beneath impoundments.

Total Cost: \$ 41,000,000

Time to Implement: 3--4 years

Alternative B5--On Site Incineration

This alternative includes:

- excavation, followed by separation of debris from low Btu value materials;
- pre-conditioning prior to incineration;
- on site incineration;
- sampling of residual ash to confirm achievement of treatment objectives;
- post-conditioning of residual ash; and
- final site restoration activities based on requirements for soils beneath impoundments.

Total Cost: \$ 66,000,000

Time to Implement: 4--5 years

Category C: Impoundment 3Alternative C1--No-Action (institutional Action)

This alternative includes:

- impoundment materials remain in-place in current condition;
- establishment of institutional controls (environmental restrictions) and improvements to physical site access controls (additional fencing); and
- long-term ground water monitoring.

Total Cost: \$ 170,000

Time to Implement: 1 month

Alternative C2--Consolidation in Impound 8

This alternative includes:

- excavation, followed by separation of debris from Impoundment 3 material;
- conditioning of excavated materials;
- transport and final placement of material in Impound 8; and
- final site restoration activities based on requirements for soils beneath the impoundments.

Total Cost: \$ 3,000,000

Time to Implement: 1 year

Alternative C3--Low Temperature Thermal Treatment (LTTT)

This alternative includes:

- excavation, followed by separation of debris from Impoundment 3 material;
- pretreatment to accomplish detoxification, neutralization, and reduction of organic constituents;
- processing of materials using LTTT system operated at optimal parameters determined during treatability testing;
- post-conditioning, as required;
- transport and final placement of treated material in Impound 8; and
- final site restoration activities based on requirements for soils beneath impoundments.

Total Cost: \$ 10,000,000

Time to Implement: 1--2 years

Alternative C4--on Site Incineration

This alternative includes:

- excavation, followed by separation of debris from Impoundment 3 material;
- preconditioning prior to incineration;
- on site incineration;
- sampling of residual ash to confirm achievement of treatment objectives;
- post-conditioning of residual ash; and
- final site restoration activities based on requirements for soils beneath impoundments.

Total Cost: \$ 14,800,000

Time to Implement: 1--3 years

Category D: Non-Hazardous Material

Alternative D1--No-Action (institutional Action)

This alternative includes:

- maintenance of existing site controls;
- institution of future land use restrictions;
- long term ground water monitoring; and
- monitoring of tar seeps.

Total Cost: \$ 170,000

Time to Implement: 1 month

Alternative D2-- Solid Phase Bioremediation with Final Placement in Impound 8

This alternative includes:

- excavation of Category D materials from the Group III impoundments followed by separation of debris;
- pre-conditioning and nutrient addition;
- biological processing using modified compost or aerated pile techniques for treatment of material;
- post-conditioning, as required;
- transport and final placement of material in Impound 8; and
- final site restoration activities based on requirements for soils beneath impoundments.

Total Cost: \$ 17,000,000

Time to Implement: 2--3 years

Alternative D3--Off Site Disposal

This alternative includes:

- excavation of Category D materials from Group III impoundments;
- transportation of excavated materials to off site landfill by licensed waste transporter; and
- final site restoration activities based on requirements for the soils beneath the impoundments.

Total Cost : \$10,000,000

Time to Implement: 1--2 years

Alternative D4 Consolidation in Impound 8

This alternative includes:

- excavation of Category D materials from Group III impoundments;
- conditioning to achieve necessary unconfined compressive strength;
- transport and final placement of material in Impound 8; and,
- final site restoration activities based on requirements for the soils beneath the impoundments.

Total Cost: \$ 1,800,000

Time to Implement: 1--2 years

Category E: General Plant DebrisAlternative E1--No-Action (Institutional Action)

This alternative includes:

- the nature of general plant debris found at the site is such that it is mixed with other materials in the Group III Impoundments, therefore, alternative E1 could only be realistically implemented in combination with alternatives A1, B1, C1, and D1.

Total Cost: Not applicable

Time to Implement: Not applicable

Alternative E2--Consolidation in Impound 8

This alternative includes:

- removal of plant debris from impoundments and separation from other impoundment materials;
- crushing of large debris to improve handling; and
- transportation to and placement in Impound 8, with adequate care to prevent damage to the liner system.

Total Cost: \$ 800,000

Time to Implement: 1--2 years

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative was assessed utilizing nine evaluation criteria as set forth in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and Office of Solid Waste and Emergency Response (OSWER) Directive 9355.3-01. These criteria were developed to address the requirements of Section 121 of CERCLA to ensure all important considerations are factored into remedy selection decisions.

The following "threshold" criteria are the most important, and must be satisfied by any alternative in order to be eligible for selection:

Threshold Criteria

1. **Overall Protection of Human Health and the Environment** addresses whether or not an alternative provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.
2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** addresses whether or not an alternative will meet the requirements of Federal and State environmental statutes or provide a basis for invoking a waiver.

The following "primary balancing" criteria are used to make comparisons and to identify the major trade-offs between alternatives:

Primary Balancing Criteria

3. **Long-term Effectiveness and Permanence** refers to the magnitude of residual risk and the ability of an alternative to maintain reliable protection of human health and the environment over time once remedial objectives have been met.
4. **Reduction of Toxicity, Mobility, or Volume** addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances as a principal element.
5. **Short-term Effectiveness** refers to the period of time that is needed to achieve protection, as well as the alternative's potential to create adverse impacts on human health and the environment that may result during the construction and implementation period.
6. **Implementability** is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular alternative.
7. **Cost** includes estimated capital and operation and maintenance costs, and the present worth costs.

The following modifying criteria are considered fully after the formal public comment period on the Proposed Plan is complete:

Modifying Criteria

8. **EPA acceptance** indicates whether, based on its review of the RI and FS reports and the Proposed Plan, the EPA supports, opposes, and/or has identified any reservations with the preferred alternative.
9. **Community acceptance** refers to the public's general response to the alternatives described in the Proposed Plan and the RI and FS reports. Responses to public comments are addressed in the Responsiveness Summary of this Record of Decision.

A comparative analysis of these alternatives, based upon the evaluation criteria noted above, is presented below.

Category A: High BTU Tar

The remedial alternatives evaluated for the high Btu tar include:

Alternative A1 - no action/institutional actions

Alternative A2 - consolidation in Impound 8

Alternative A3 - LTTT

Alternative A4 - on-site incineration.

Overall Protection of Human Health and Environment

This criterion addresses whether or not a remedy provides adequate protection and describes how risks are eliminated, reduced or controlled through treatment, engineering controls or institutional controls.

Alternative A1 would not provide overall protection of human health and the environment and thus will not be further discussed for this material category in this sub-section. Alternatives A2, A3, and A4 would provide equivalent protection through removal and containment of the tars in the Impound 8 facility. Alternatives A3 and A4 would provide an increased level of protectiveness through active treatment, with Alternative A4 providing the highest level of overall protection with the highest degree of contaminant removal through incineration.

Compliance with ARARs

This criterion addresses whether or not a remedy will meet all of the ARARs of other environmental statutes and/or provides grounds for invoking a waiver.

Universal Treatment Standards (UTSs) specified in EPA's Land Disposal Restrictions (LDRs) are chemical-specific ARARs for Alternatives A2, A3, and A4 as the material would be removed from the impoundments and disposed in Impound 8. There are three possible options to comply with this requirement: 1) achieve the UTSs, 2) obtain a treatability variance for soils and debris (using 6A guidance levels), or 3) granting a CAMU and developing alternative treatment standards. Superfund LDR Guide # 6A (OSWER 9347.3-06FS, September 1990) outlines the process for obtaining and complying with the treatability variance for soil and debris that are contaminated with RCRA hazardous waste until such time that EPA promulgates treatment standards for soil and debris. For Alternative A2, the third option associated with alternative treatment standards under a CAMU is the only way to meet this ARAR based on raw material characterization. LTTT testing performed to evaluate Alternative A3 proved that the treated material also did not achieve UTSs or treatability variance levels using the 6A guidance levels. Therefore, option 3 is also the only way for Alternative A3 to meet the ARAR. Alternative A4, on-site incineration, would be expected to meet either option 1 or option 2 through destruction of the organic material. Alternatives A2, A3, and A4 would each meet the chemical-specific ARAR.

The New Jersey Flood Hazards Control Act Regulations (NJAC 7:13 et seq.) would be a location-specific ARAR for each of the alternatives. This ARAR would be met through specifying the substantive Flood plain requirements in the remedial action contract and by maintaining compliance through remedial action monitoring. In addition, the New Jersey Standards for New Hazardous Waste Facilities (NJAC 7:26-10.3) would be another location-specific ARAR for Alternatives A2, A3, and A4 as placement of the materials would be in Impound 8. This ARAR would be met for these alternatives by specifying the substantive requirements in the remedial action contract and by maintaining compliance with those requirements through remedial action monitoring. Each of the Alternatives A1, A2, A3, and A4 would therefore meet location-specific ARARs.

Action-specific ARARs identified for Alternatives A2, A3, and A4 include the NJDEP Technical Requirements for Site Remediation (NJAC 7:26E et. seq.) and Occupational Safety and Health Administration (OSHA) regulations. These ARARs would be met through specifying the substantive requirements in the remedial action contract and by monitoring compliance during inspection activities. Additional action-specific ARARs would be triggered for Alternatives A2, A3, and A4 due to material excavation, conditioning and/or treatment, and placement in Impound 8. These ARARs would include New Jersey Air Regulations; Stream Encroachment and Sediment Control (SESC) requirements; New Jersey Hazardous Waste Regulations related to residual waste disposal; Department of Transportation (DOT) transport requirements; RCRA regulations pertaining to Impound 8 for placement of material for all categories (closure, post-

closure and ground water monitoring); cultural resources and stream encroachment. These ARARs would also be met through specification of the substantive requirements in the remedial action contract- documents and during remedial action monitoring to maintain compliance. Each of the Alternatives A2, A3, and A4 would meet action specific ARARs.

In addition to state location- and action-specific ARARs, the following are Federal ARARs for all alternatives except no action alternatives for all material categories: The Clean Air Act (CAA), New Source Performance Standards (NSPS), National Ambient Air Quality Standards (NAAQS), the National Historic Preservation Act and Section 404 of the Clean Water Act (for wetlands). These ARARs would be met by specifying the substantive requirements in the remedial design/remedial action contract and by maintaining compliance with those requirements through remedial action monitoring.

Alternative A4 would achieve this criterion best with Alternatives A3 and A2 in that order.

Long-Term Effectiveness and Permanence

This criterion refers to the ability of the remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

Alternatives A2, A3, and A4 would provide long-term effectiveness by minimizing residual risk through removal, solidification for strength and reduction of metals leachability, and containment of the high Btu tars in the Impound 8 facility. Each of these measures is an adequate and reliable method for minimizing human exposure and minimizing migration of the tar constituents. Alternatives A3 and A4 would further minimize human exposure and enhance long-term effectiveness through treatment with Alternative A4 providing increased long-term effectiveness with the highest degree of contaminant removal through incineration. Alternatives A3 and A4 would permanently reduce the levels of contaminants that are present in the impoundment material.

Reduction of Toxicity, Mobility, or Volume Through Treatment

This criterion addresses the degree to which a remedy utilizes treatment technologies to reduce toxicity, mobility or volume of contaminants.

Alternative A2 would provide for a reduction in mobility through solidification and placement in Impound 8. A slight material volume increase (approximately 10%) is expected due to the addition of conditioning admixtures. Alternative A3 offers a greater reduction in contaminant mass and toxicity through active treatment to meet the CAMU treatment objectives. A reduction in mobility is provided through placement in Impound 8. A net material volume increase of 25% is expected due to pre-LTTT conditioning and post-LTTT conditioning with admixtures. Alternative A4 offers the greatest reduction in containment mass and toxicity due to material destruction. Mobility would again be reduced due to placement in Impound 8. A net material

volume decrease of approximately 80% is expected due to material conversion into gaseous products of combustion. Alternative A4 would provide the highest reduction of toxicity, mobility, and volume with the highest degree of contaminant removal through incineration. Alternatives A3 and A4 would permanently reduce the levels of contaminants that are present in the impoundment material.

Short-Term Effectiveness

This criterion considers the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

Alternatives A2, A3, and A4, the community would be restricted from access to the site during remediation through locking gates currently in-place and an existing manned guard post. Appropriate worker protective equipment would be used during monitoring activities for remedial activities in Alternatives A2, A3, and A4. Appropriate mitigation measures would be implemented to control vapor emissions/odors during excavation and treatment of the high Btu tar in Alternatives A2, A3, and A4. With respect to Alternatives A2 and A3, appropriate mitigation measures would be used during remedial activities to minimize environmental impacts. Use of appropriate controls would therefore provide for equivalent short-term effectiveness with respect to human health in each of Alternatives A2, A3, and A4. Alternatives A2, A3, and A4 would provide for equivalent short-term effectiveness with respect to the environment with appropriate controls, while environmental impacts would not be minimized in Alternative A1 since migration of constituents could continue for the in-place material.

With respect to the RAOs, Alternatives A2, A3, and A4 would achieve RAOs upon completion of remedial activities. Completion of remedial activities associated with Alternative A2 would be within approximately 1 to 2 years. Completion of remedial activities associated with Alternative A3 and Alternative A4 would be within approximately 2 to 5 years. Alternatives A2, A3, and A4 would provide protection of human health and the environment, limit construction worker contact with high Btu tars, and avoid activities which could cause the mobilization of contaminants. Alternative A1 would not attain RAOs, but it can be implemented immediately. Of the remaining alternatives, Alternative A2 is better than Alternatives A3 and A4 because it can achieve the RAOs in a shorter time frame than Alternatives A3 and A4.

Implementability

This criterion examines the technical and administrative feasibility of a remedy, including availability of materials and services needed to implement the chosen solution.

Alternative A2 is readily implementable. Alternative A3 is also feasible based upon the 1995 and 1996 LTTT pilot study results. Alternative A4 is considered to be moderately implementable with the same requirements as A3. Coordination with the NJDEP would be required for implementing air controls and conducting remedial actions for Alternatives A2, A3, and A4. The technologies presented in Alternatives A2, A3, and A4 are considered to be reliable and effective at meeting the Group III treatment objectives. Impound 8 is considered to be readily available to receive treated materials from Alternatives A2, A3, and A4. Alternative A1 is most readily implementable. Of the remaining alternatives which attain RAOs, Alternative A2 is most implementable.

Cost

This criterion includes capital as well as operation and maintenance costs representing 30-year present worth value.

The total cost (30 year present worth) for each of the Alternatives evaluated is as follows:

Alternative A2:	\$20,900,000
Alternative A3:	\$30,100,000
Alternative A4:	\$40,800,000

EPA Acceptance

This criterion indicates whether, based on their review of the RI/FS and Proposed Plan, the EPA concurs with, opposes, or has no comment on the selected remedy.

EPA concurs with the selected remedy.

Community Acceptance

This criterion assesses the public comments received on the Proposed Plan.

The community supports the selected remedy. Community comments received during the public meeting and public comment period are included in the responsiveness summary together with NJDEP response, which is part of this ROD.

Category B : Low BTU Tar/Sludge

The remedial alternatives evaluated for the low Btu tar/sludge include:

Alternative B1 - no action/institutional actions

Alternative B2 - consolidation in Impound 8

Alternative B3 - bioremediation

Alternative B4 - LTTT

Alternative B5 - on-site incineration.

Overall Protection of Human Health and Environment

Alternative B1 would not provide overall protection of human health and the environment and thus will not be further discussed for this material category in this sub-section. Alternatives B2, B3, B4, and B5 would provide equivalent protection through removal and containment of the low Btu tar/sludge in Impound 8. Alternatives B2, B3, B4, and B5 would minimize human exposure to the low Btu tar/sludge material and minimize constituent migration through removal and containment of the tars in Impound 8. Alternatives B3, B4 and B5 would provide an increased level of protectiveness through treatment of the low Btu tar/sludge, with Alternative B5, providing the highest level of overall protection of human health and the environment with the highest degree of contaminant removal through incineration.

Compliance with ARARs

UTSs specified in EPA's LDRs are chemical-specific ARARs for Alternatives B2, B3, B4, and B5 as the material would be removed from the impoundments and disposed in Impound 8. There are three possible options to comply with this requirement: 1) achieve the UTSs, 2) obtain a treatability variance for soils and debris (using 6A guidance levels), or 3) granting a CAMU and developing alternative treatment standards. For Alternative B2, the third option associated with alternative treatment standards under a CAMU is the only way to meet this ARAR based on raw material characterization. Bioremediation testing performed to evaluate Alternative B3 proved that the treated material also did not achieve UTSs or treatability variance levels using the 6A guidance levels. It is expected that LTTT would also not achieve UTSs or treatability variance levels using 6A guidance levels. Therefore, option 3 is also the only way for Alternatives B3 and B4 to meet the ARAR. Alternative B4, on-site incineration, would be expected to meet either option 1 or option 2 through destruction of the organic material. Alternatives B2, B3, B4, and B5 would each meet the chemical-specific ARAR.

The New Jersey Flood Hazards Control Act Regulations (NJAC 7:13 et. seq.) would be a location-specific ARAR for each of the alternatives. This ARAR would be met through specifying the substantive Flood plain requirements in the remedial action contract and by maintaining compliance through remedial action monitoring. In addition, the New Jersey Standards for New Hazardous Waste Facilities (NJAC 7:26-10.3) would be another location-specific ARAR for Alternatives B2, B3, B4, and B5 as placement of the materials would be in Impound 8. This ARAR would be met for these alternatives by specifying the substantive requirements in the remedial action contract and by maintaining compliance with those requirements through remedial action monitoring. Alternatives B1, B2, B3, B4, and B5 would meet the location-specific ARARs.

Action-specific ARARs identified for Alternatives B2, B3, B4, and B5 include the 1988 ACO, NJDEP Technical Requirements for Site Remediation (NJAC 7:26E et. seq.) and OSHA regulations. These ARARs would be met through specifying the substantive requirements in the remedial action contract and by monitoring compliance during inspection activities. Additional action-specific ARARs would be triggered for Alternatives B2, B3, B4 and B5 due to material excavation, conditioning and/or treatment, and placement in Impound 8. These ARARs would include New Jersey air regulations; New Jersey SESC requirements; New Jersey Hazardous Waste Regulations related to residual waste disposal; DOT transport requirements; and RCRA regulations pertaining to Impound 8. These ARARs would also be met through specification of the substantive requirements in the remedial action contract documents and during remedial action monitoring to maintain compliance. Each of the alternatives would meet the action-specific ARARs. Alternative B4 would achieve this criterion best with Alternatives B3 and B2 in that order.

Long-Term Effectiveness and Permanence

Alternatives B2, B3, B4, and B5 would provide long-term effectiveness by minimizing residual risk through removal, solidification for strength and reduction of metals leachability, and containment of the low Btu tar/sludge in the Impound 8 facility. Each of these measures is an adequate and reliable method for minimizing human exposure and minimizing migration of the tars constituents. Alternatives B3, B4, and B5 would further minimize human exposure and enhance long-term effectiveness through treatment with Alternative B5 providing increased long-term effectiveness with the highest degree of contaminant removal through incineration. Alternatives B3, B4 and B5 would permanently reduce the levels of contaminants that are present in the impoundment material.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternative B2 would provide for a reduction in mobility through solidification and placement in Impound 8. A slight volume increase (approximately 10%) is expected due to the addition of conditioning admixtures. Alternatives B3 and B4 offer a greater reduction in contaminant mass and toxicity through active treatment to meet the CAMU treatment objectives. A reduction in

mobility is provided through placement in Impound 8. Alternative B3 would have a net material volume increase of approximately 200% due to required pre- and post-conditioning. A net material volume increase of 25% is expected for Alternative B4 due to pre-LTTT conditioning and post-LTTT conditioning with admixtures. Alternative B5 offers the greatest reduction in contaminant mass and toxicity due to material destruction in order to meet UTS or 6A variance levels. Mobility would again be reduced due to placement in Impound 8. A net material volume decrease of approximately 80% is expected due to material conversion into gaseous products of combustion. Alternative B5 would provide the highest reduction of toxicity, mobility, and volume with the highest degree of contaminant removal through incineration. Alternatives B3, B4, and B5 would permanently reduce the levels of contaminants present in the impoundment material.

Short-Term Effectiveness

In each alternative, the community would be restricted from access to the site during remediation through locking gates currently in-place and an existing manned guard post. Appropriate worker protective equipment would be used during monitoring activities in Alternatives B2, B3, and B4. Appropriate mitigation measures would be implemented to control vapor emissions during excavation and treatment of the low Btu tar/sludge in Alternatives B2, B3, and B4. With respect to Alternatives B2, B3, and B4, appropriate mitigation measures would be used during remedial activities to minimize environmental impacts. The use of appropriate controls would therefore provide for equivalent short-term effectiveness with respect to human health in each alternative. Alternatives B2, B3, B4 and B5 would provide for equivalent short-term effectiveness with respect to the environment with appropriate controls, while environmental impacts would not be minimized in Alternative B1 since migration of constituents to the ground water would continue for the in-place material.

With respect to the RAO, Alternatives B2, B3, B4, and B5 would achieve the RAO upon completion. Alternative B2 would achieve the RAO in a time frame of 1 to 2 years. Alternative B3 would achieve the RAO in a time frame of approximately 5 to 7 years. Alternative B4 would achieve the RAO in an approximate 3 to 4 year time frame, and Alternative B5 would achieve the RAO in an approximate 4 to 5 year time frame. Alternatives B2, B3, B4 and B5 would provide protection of human health and the environment, limit construction worker contact with the low Btu tar/sludge material, and avoid activities which could cause the mobilization of contaminants. Alternative B2 is better than Alternatives B3, B4, and B5 because it can achieve the RAOs in a shorter time frame than these alternatives.

Implementability

Alternative B2 is readily implementable. Alternatives B3 and B4 are also implementable based upon results of the 1995 and 1996 bioremediation treatability study and the 1995 and 1996 LTTT treatability study, respectively (Appendices A and B). Bioremediation is a natural, lower energy, and less intensive remedial technology than LTTT. It does not require the extent of mobilization,

processing equipment or air pollution control as does LTTT. Alternative B5 is considered to be moderately implementable with the same requirements as B4. Coordination with the NJDEP would be required for implementation of air controls associated with Alternatives B2, B3, B4 and B5. The technologies presented in Alternatives B3, B4, and B5 are considered to be reliable and effective at meeting the Group III treatment objectives. Impound 8 is anticipated to be available to receive treated residuals from Alternatives B2, B3, B4, and B5. Out of those alternatives which attain RAOs, Alternative B2 is most implementable.

Cost

The total cost for each of the alternatives evaluated is as follows:

Alternative B2:	\$14,000,000
Alternative B3:	\$33,000,000
Alternative B4:	\$41,000,000

EPA Acceptance

EPA concurs with the selected remedy.

Community Acceptance

Community supports the selected remedy. Community comments received during the public meeting and public comment period are included in the responsiveness summary together with NJDEP response, which is part of this ROD.

Category C : Impoundment 3

The remedial alternatives evaluated for the low Btu tar/sludge include:

Alternative C1 - no action/institutional actions

Alternative C2 - consolidation in Impound 8

Alternative C3 - LTTT

Alternative C4 - on-site incineration.

Overall Protection of Human Health and Environment

Alternative C1 would not provide overall protection of human health and the environment and thus will not be further discussed for this material category in this sub-section. Alternatives C2, C3, and C4 would provide equivalent protection through removal and containment in Impound 8. Alternatives C2, C3 and C4 would minimize human exposure to the Impoundment 3 material and

minimize constituent migration through containment of the material in Impound 8. Alternatives C3 and C4 would provide an increased level of protection through treatment of the Impoundment 3 material, with Alternative C4 providing the highest level of overall protection of human health and the environment with the highest degree of contaminant removal through incineration.

Compliance with ARARs

UTSs specified in EPA's LDRs are chemical-specific ARARs for Alternatives C2, C3, and C4 as the material would be removed from the impoundments and disposed in Impound 8. There are three possible options to comply with this requirement: 1) achieve the UTSs, 2) obtain a treatability variance for soils and debris (using 6A guidance levels), or 3) granting a CAMU and developing alternative treatment standards. For Alternative C2, the third option associated with alternative treatment standards under a CAMU is the only way to meet this ARAR based on raw material characterization. It is expected that LTTT in Alternative C3 would not achieve UTSs or treatability variance levels using the 6A guidance levels. Therefore, option 3 is also the only way for Alternative C3 to meet the ARAR. Alternative C4, on-site incineration, would be expected to meet either option 1 or option 2 through destruction of the organic material. Alternatives C2, C3, and C4 would each meet the chemical-specific ARAR.

The New Jersey Flood Hazards Control Act Regulations (NJAC 7:13 et. seq.) would be a location-specific ARAR for each of the alternatives. This ARAR would be met through specifying the substantive Flood plain requirements in the remedial action contract and by maintaining compliance through remedial action monitoring. In addition, the New Jersey Standards for New Hazardous Waste Facilities (NJAC 7:26-10.3) would be another location-specific ARAR for Alternatives C2, C3, and C4 as placement of the materials would be in Impound 8. This ARAR would be met for these alternatives by specifying the substantive requirements in the remedial action contract and by maintaining compliance with those requirements through remedial action monitoring. Each alternative would meet the location specific ARARs.

Action-specific ARARs identified for Alternatives C2, C3, and C4 include the 1988 ACO, NJDEP Technical Requirements for Site Remediation (NJAC 7:26E et. seq.) and OSHA regulations. These ARARs would be met through specifying the substantive requirements in the remedial action contract and by monitoring compliance during inspection activities. Additional action-specific ARARs would be triggered for Alternatives C2, C3, and C4 due to material excavation, conditioning and/or treatment, and placement in Impound 8. These ARARs would include New Jersey air regulations, New Jersey SESC requirements; New Jersey Hazardous Waste Regulations related to residual waste disposal; DOT transport requirements; and RCRA regulations pertaining to Impound 8. These ARARs would also be met through specification of the substantive requirements in the remedial action contract documents and during remedial action monitoring to maintain compliance. Each alternative would meet the action-specific ARARs.

Alternative C4 would achieve this criterion best with Alternatives C3 and C2 in that order.

Long-Term Effectiveness and Permanence

Alternatives C2, C3, and C4, would provide long-term effectiveness by minimizing residual risk through removal, solidification for strength and reduction of metals leachability, and containment of the Impoundment 3 material in Impound 8. Each of these measures is an adequate and reliable method for minimizing human exposure and minimizing migration of the Impoundment 3 constituents and would provide long-term effectiveness. Alternatives C3 and C4 would further minimize human exposure and enhance long-term effectiveness through treatment with Alternative C4 providing increased long-term effectiveness with the highest degree of contaminant removal through incineration. Alternatives C3 and C4 would permanently reduce the levels of contaminants that are present in the impoundment material.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternative C2 would provide for a reduction in mobility through solidification and placement in Impound 8. A slight material volume increase (approximately 10%) is expected due to the addition of conditioning admixtures. Alternative C3 offers a greater reduction in contaminant mass and toxicity through active treatment to meet the CAMU treatment objectives. A reduction of mobility is provided through placement in Impound 8. Alternative C3 would result in approximately 30% net material volume increase due to pre-LTTT and post-LTTT conditioning with admixtures. Alternative C4 offers the greatest reduction in contaminant mass and toxicity due to material destruction in order to meet UTS or 6A variance levels. Mobility would again be reduced due to placement in Impound 8. A net material volume decrease of approximately 80% is expected due to material conversion into gaseous products of combustion. Alternative C4 would provide the highest reduction of toxicity, mobility, and volume with the highest degree of contaminant removal through incineration. Alternatives C3 and C4 would permanently reduce the levels of contaminants that are present in the impoundment material.

Short-Term Effectiveness

In Alternatives C2, C3 and C4 the community would be restricted from access to the site during remediation through locking gates currently in-place and an existing manned guard station. Appropriate worker protective equipment would be used during monitoring activities in Alternative C1 and in remedial activities in Alternatives C2, C3, and C4. Appropriate mitigation measures would be implemented to control vapor emissions during excavation and treatment of the Impoundment 3 material in Alternatives C2, C3, and C4. With respect to Alternatives C2, C3 and C4, appropriate mitigation measures would be used during remedial activities to minimize environmental impacts. The use of appropriate controls would therefore provide for equivalent short-term effectiveness with respect to human health in each alternative. Alternatives C2, C3, and C4 would provide for equivalent short-term effectiveness with respect to the environment.

With respect to the RAO, Alternatives C2, C3, and C4 would achieve the RAO upon completion. Alternative C2 would achieve the RAO in 1 year. Alternative C3 would achieve the RAO in approximately 1 to 2 years. Alternative C4 would achieve the RAO in an approximate 1 to 3 year time frame. Alternatives C2, C3, and C4 would provide protection of human health and the environment, limit construction worker contact with Impoundment 3 material, and avoid activities which could cause the mobilization of contaminants. Alternative C2 is better than Alternatives C3 and C4 because it can achieve the RAOs in a shorter time frame than these alternatives.

Implementability

Alternative C2 is readily implementable. Alternative C3 is also readily implementable based upon results of 1995 and 1996 LTTT pilot study results. Pretreatment in Alternative C3 is also considered to be readily implementable based on the results of that pilot test. Alternative C4, is considered to be moderately implementable with the same requirements as C3. Coordination with the NJDEP would be required for implementation of air controls associated with treatment technologies and conducting remedial actions for Alternatives C2, C3, and C4. The technologies presented in Alternatives C3 and C4 are considered to be reliable and effective at meeting the Group III treatment objectives. Impound 8 is considered to be readily available to receive treated materials from Alternatives C2, C3, and C4. Of the alternatives which meet RAOs, Alternative C2 is most implementable.

Cost

The total cost for each of the alternatives evaluated is as follows:

Alternative C2:	\$3,000,000
Alternative C3:	\$10,000,000
Alternative C4:	\$14,800,000

EPA Acceptance

EPA concurs with the selected remedy.

Community Acceptance

Community supports the selected remedy. Community comments received during the public meeting and public comment period are included in the responsiveness summary together with NJDEP response, which is part of this ROD.

Category D : Non-Hazardous Material

The remedial alternatives evaluated for the low Btu tar/sludge include:

Alternative D1 - no action/institutional actions

Alternative D2 - bioremediation with final placement in Impound 8

Alternative D3 - off site disposal

Alternative D4 - consolidation in Impound 8

Overall Protection of Human Health and Environment

Alternative D1 would not provide overall protection of human health and the environment and thus will not be further discussed for this material category in this sub-section. Alternatives D2, D3, and D4 would provide equivalent protection through containment in Impound 8 or an off-site landfill. Alternative D2 would minimize human exposure to the material constituents and minimize migration to environmental media through removal, bioremediation and containment of the material in Impound 8. Alternatives D3 and D4 would also minimize human exposure and migration to environmental media through removal and containment of the material at either an off-site disposal facility or on-site at Impound 8. Alternative D2 would provide the highest level of overall protection of human health and the environment with treatment prior to containment.

Compliance with ARARs

No chemical-specific ARARs were identified for the 4 alternatives as Category D material is classified as non-hazardous. Alternatives D2, D3, and D4 would be subject to New Jersey Flood Hazard Control Act Regulations (NJAC and:13-1 et. seq.). This ARAR would be met by having on-site work conducted in Flood plain areas consistent with substantive permit regulations. Alternative D2, D3, and D4 would meet the location-specific ARARs.

The 1988 ACO, NJDEP Technical Requirements for Site Remediation (NJAC 7:26E et. seq.) and OSHA regulations as well as New Jersey SESC, DOT transport requirements, and New Jersey air control regulations, are potentially applicable action-specific ARARs for Alternatives D2, D3, and D4. These ARARs, as applicable, would be met by specifying and monitoring activities so that they are in compliance with the substantive requirements of these regulatory programs. Each alternative would meet the action-specific ARARs.

Long-Term Effectiveness and Permanence

Alternatives D2, D3, and D4 would minimize residual risk through removal, solidification for strength and reduction of metals leachability, and containment. Alternatives D2, D3, and D4 are adequate and reliable methods for minimizing human exposure, minimizing migration of the

constituents, and would provide long-term effectiveness, with Alternative D2 providing increased long-term effectiveness with the highest degree of contaminant removal through bioremediation. Alternative D2 would permanently reduce the levels of contaminants that are present in the impoundment material.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternatives D2, D3 and D4 would provide for a reduction in mobility through solidification and placement in an off-site landfill or Impound 8. A slight material volume increase (approximately 10%) is expected due to the addition of conditioning admixtures. Alternative D2 offers a greater reduction in contaminant mass and toxicity through active treatment to meet the CAMU treatment objectives. A reduction in mobility is provided through placement in Impound 8. Alternative D2 would have a net material volume increase of approximately 200% for Impoundment 5 material and 100% for Impoundment 26 material due to required pre- and post-conditioning. Alternative D2 would provide the highest reduction of toxicity, mobility, and volume with the highest degree of contaminant removal through bioremediation. Alternative D2 would permanently reduce the levels of contaminants that are present in the impoundment material.

Short-Term Effectiveness

In Alternatives D2, D3, and D4, the community would be restricted from access to the site during remedial activities through locking gates currently in-place and an existing manned guard post. Appropriate worker protective equipment would be used during monitoring activities in Alternative D1 and in remedial activities for Alternatives D2, D3, and D4. Appropriate mitigation measures would be implemented to control vapor emissions during excavation of the non-hazardous material in Alternatives D2, D3, and D4. With respect to Alternatives D2, D3, and D4, appropriate mitigation measures would be used during remedial activities to minimize environmental impacts. The use of appropriate controls would therefore provide an equivalent level of short-term effectiveness with respect to human health in each alternative. Alternatives D2, D3, and D4 would provide for equivalent short-term effectiveness with respect to the environment with appropriate controls while, environmental impacts would not be minimized in Alternative D1, since migration of constituents to the ground water could continue from the contained material.

With respect to the RAO, Alternative D2 would achieve the RAO upon completion of construction activities within approximately 2 to 3 year. Alternatives D3 and D4 would achieve the RAO upon completion of construction activities within approximately 1 to 2 year. Alternatives D3 and D4 are better than alternative D2 because they can achieve the RAOs in a shorter time frame.

Implementability

Alternative D2 and D4 are also readily implementable based upon the availability of Impound 8. Alternative D3 is readily implementable assuming that the characterization of the material is acceptable to the off-site disposal facility with no further treatment. Coordination with the

NJDEP would be required for implementation of air pollution controls associated with materials conditioning for Alternatives D2, D3, and D4. Alternative D2 would also require air pollution controls during active treatment. Of the alternatives which attain RAOs, Alternative D4 is most implementable. Alternative D2 would permanently reduce the levels of contaminants that are present in the impoundment material.

Cost

The total cost for each of the alternatives evaluated is as follows:

Alternative D2:	\$17,000,000
Alternative D3:	\$10,000,000
Alternative D4:	\$1,800,000

EPA Acceptance

EPA concurs with the selected remedy.

Community Acceptance

Community supports the selected remedy. Community comments received during the public meeting and public comment period are included in the responsiveness summary together with NJDEP response, which is part of this ROD.

Category E : General Plant Debris

The remedial alternatives which are being evaluated for the general plant debris material include:

Alternative E1 - no action

Alternative E2 - consolidation into Impound 8

Overall Protection of Human Health and Environment

Alternative E1, is not protective based on residual sludge that may be present and thus will not be further discussed for this material category in this sub-section. Alternative E2 would be protective of human health and the environment.

Compliance with ARARs

No chemical specific ARARs were identified for Alternative E2.

The New Jersey Flood Hazards Control Act Regulations (NJAC 7:13-1 et. seq.) would be a location-specific ARAR associated with Alternative E2. On-site work conducted in Flood plain areas would need to be consistent with substantive permit requirements.

Action-specific ARARs identified for Alternative E2 include the 1988 ACO, NJDEP Technical Requirements for Site Remediation (NJAC 7:26E et. seq.) and OSHA regulations, as well as New Jersey SESC requirements and DOT transport requirements. Remedial actions comprising Alternative E2 would be conducted in accordance with these action-specific ARARs. Alternative E2 would attain action-specific ARARs.

Long-Term Effectiveness and Permanence

Alternative E2 would provide minimal residual risk through removal and containment of the general plant debris in the Impound 8 facility. Alternative E2 would also provide long-term effectiveness by consolidation into Impound 8.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternative E2 will provide for minimization of mobility of constituents through containment in Impound 8.

Short-Term Effectiveness

In Alternative E2, the community would be restricted from access to the site during excavation and handling activities through locking gates currently in-place and an existing manned guard post. Appropriate worker protective equipment would be used during excavation activities in Alternative E2.

Implementability

Alternative E2 is readily implementable based upon the availability of Impound 8.

Cost

Estimated cost of Alternative E2 is \$800,000.

EPA Acceptance

EPA concurs with the selected remedy.

Community Acceptance

Community supports the selected remedy. Community comments received during the public meeting and public comment period are included in the responsiveness summary together with NJDEP response, which is part of this ROD.

SELECTED REMEDY

Based upon an evaluation of the various remedial alternatives and after consideration of community comments, NJDEP and EPA have selected the following alternatives for the Group III Impoundments (the alternatives are organized according to the Category of Group III waste materials that each will be applied to):

Category A (High BTU Tar): Alternative A3 - LTTT

Category B (Low BTU tar/sludge): Alternative B3 - Bioremediation

Category C (Impoundment 3 material): Alternative C3 - LTTT

Category D (Non hazardous material): Alternative D4 - Consolidation in Impound 8

Category E (General Plant Debris): Alternative E2 - Consolidation in Impound 8

Note: Based on community input, anaerobic LTTT that operates at conditions which approach incineration has been eliminated from further consideration. However, there are other anaerobic LTTT systems, which do not operate at those conditions. Those systems may use steam or other inert gases (such as nitrogen) to provide anaerobic conditions. They can operate in the temperatures ranges of aerobic systems. In order to provide the most flexibility within the remedial design process such that most technically effective and cost-efficient technology is implemented, the specific LTTT technology to achieve the treatment objectives has not been specified in the ROD. It will be specified in the remedial design.

A brief description of the selected alternative for each category is provided below:

High BTU tar (Impoundments 1 and 2): Excavation of the impoundment materials; pre-conditioning with additives; Low Temperature Thermal Treatment; post-conditioning to meet physical disposal criteria; and consolidation into the Impound 8 facility.

In addition to the sludge within these impoundments, underlying soil that exists above the ground water will be removed, treated and disposed. These soils exhibit similar characteristics as the overlying sludge. By removing these soils, final site restoration can occur as part of the remedial action. Residual compounds present in the ground water would be addressed as part of the site-wide ground water program.

Low BTU tar (Impoundments 4, 5 (wet), 14, and 20): Excavation of impoundment materials; separation of oversized materials; preconditioning; and treatment using solid phase bioremediation; and solidification of the treated residuals (as necessary for strength) and final consolidation of the treated residuals into the Impound 8 facility.

Impoundment 3 material: Excavation of the impoundment contents; pre-conditioning with additives; performance of LTTT; post-conditioning to meet physical disposal criteria; and consolidation into the Impound 8 facility.

Non-hazardous material: Excavation; conditioning for strength, separation and cleaning of the oversized materials; and consolidation into the Impound 8 facility.

General plant debris: Separation from other impoundment material; separation of residual surface sludge for treatment; size reduction as needed for processing; and consolidation into Impound 8 facility, as appropriate, based on size of debris.

As discussed previously, remedial alternatives requiring final placement in Impoundment 8 of material Categories A, B, C, and D will achieve unconfined compressive strength requirements and Toxicity Characteristics Leaching Procedure (TCLP) limits for metals. Because of the nature of the material, remedial alternatives requiring placement in Impoundment 8 Facility of material Category E will achieve the strength criteria only.

These selected alternatives satisfy the remedial action objectives and the requirements of CERCLA, as amended by SARA; the National Contingency Plan, RCRA, as amended by HSWA; and the ACO. Because these remedies would result in hazardous substances remaining on the site, a review would be conducted every five years after implementation of this remedy to ensure that the remedy continues to provide adequate protection of human health and the environment.

Rationale for Selected Remedy for Group III Impoundments

The following reasons provide the basis for the selected remedial alternatives:

- Bioremediation would be effective in removing the compounds of concern for material Category B;
- The site is suited to bioremediation (for Category B) because the existing bacteria are already acclimated to the waste materials, and have been shown in the laboratory and during the pilot study to satisfactorily degrade the compounds of concern;
- LTTT and bioremediation combination provide flexibility in remediating the wide variety of heterogeneous material within the Group III impoundments;
- LTTT will be used to achieve Group III treatment objectives for materials that are not amenable to bioremediation; and
- The combination of bioremediation and LTTT is more cost-effective, yet provides a comparable level of protection.

Final placement of all material will be in Impound 8, a state-of-the-art waste management facility.

The on-site Impound 8 Facility is equipped with a multi-liner system (see Figure 2), a leachate detection and collection system as well as a ground water monitoring system that would cumulatively provide adequate and appropriate protection of human health and the environment. The liner system is chemically compatible with the materials which will be placed in Impound 8.

A contingency plan has been in-place in the event that contaminants and/or leakage is detected below the secondary liner system of Impound 8. The plan includes monitoring of the subsurface drainage system, which is located beneath the tertiary liner, in the event that leachate is present within the leachate detection system at levels greater than the Action Leakage Rate specified in

the regulations. In the event that leachate is detected beneath the tertiary liner, a ground water containment/collection program will be implemented. This program would include the installation of a ground water extraction system at the Impound 8 Facility.

The selected alternatives would provide the best balance of trade-offs among alternatives with respect to the nine CERCLA evaluation criteria. NJDEP and EPA selected these alternatives because they would be protective of human health and the environment, comply with ARARs, be cost-effective, and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The selected remedies also meet the statutory preference for the use of treatment as a principal element to the maximum extent practicable.

STATUTORY DETERMINATIONS

Under their legal authorities, NJDEP's and EPA's primary responsibility at Superfund Sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for Group III Impoundments at the American Cyanamid Superfund Site must comply with applicable, or relevant and appropriate environmental standards established under federal and state environmental laws unless a statutory waiver is justified. The selected remedy also must be cost effective and utilize permanent solutions and alternative treatment technologies or resource-recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes. The following sections discuss how the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

All selected alternatives (*i.e.*, Alternative A3, LTTT; Alternative B3, bioremediation; Alternative C3, LTTT; and Alternatives C4 and E2, consolidation) address the human health-based remedial action objectives associated with Category A, B, C, D, and E Materials and are, therefore, considered to be effective in achieving protection of human health and the environment in both the short and long term.

Category A Material: High BTU Tar

Alternative A3 provides protectiveness through active treatment of high BTU tar. Alternative A3 treated material will be placed in Impound 8, therefore providing adequate overall protection of human health and the environment.

Category B Material: Low BTU Tar/Sludge

Alternative B3 provides protectiveness through treatment of the low BTU tar/sludge. Alternative B3 treated material will be placed in Impound 8, therefore providing adequate overall protection of human health and the environment.

Category C Material : Impoundment 3 Material

Alternative C3 provides an increased level of protectiveness through treatment of the Impoundment 3 material and minimize constituent migration through containment of the material in Impound 8. Alternative C3 treated material will be placed in Impound 8, therefore providing adequate overall protection of human health and the environment.

Category D Material: Non Hazardous Material

Alternative D4 eliminates human exposure and migration to environmental media through removal and containment of the material at either an off-site disposal facility or on-site at Impound 8, therefore providing adequate overall protection of human health and the environment.

Category E Material: General Plant Debris

Alternative E2 eliminates human exposure and migration to environmental media through removal and containment of the material at either an off-site disposal facility or on-site at Impound 8, therefore providing adequate overall protection of human health and the environment.

Compliance with Applicable or Relevant and Appropriate Requirements

This criterion addresses how the Alternatives will meet all of the ARARs of other environmental statutes and/or provides grounds for invoking a waiver.

Categories A, B and C Materials

Universal Treatment Standards (UTSs) specified in EPA's Land Disposal Restrictions (LDRs) are chemical-specific ARARs for Alternatives A3, B3 and C3 as the materials will be removed from the impoundments and disposed in Impound 8. There are three possible options to comply with this requirement: 1) achieve the UTSs, 2) obtain a treatability variance for soils and debris (using 6A guidance levels), or 3) granting a CAMU and developing alternative treatment standards. Superfund LDR Guide # 6A (OSWER 9347.3-06FS, September 1990) outlines the process for obtaining and complying with the treatability variance for soil and debris that are contaminated with RCRA hazardous waste until such time that EPA promulgates treatment standards for soil and debris. Option 3 will allow Alternatives A3, B3 and C3 to comply with the ARARs.

The New Jersey Flood Hazards Control Act Regulations (NJAC 7:13 et seq.) will be a location-specific ARAR for Alternatives A3, B3 and C3. This ARAR will be met through specifying the substantive Flood plain requirements in the remedial action contract and by maintaining compliance through remedial action monitoring. In addition, the New Jersey Standards for New Hazardous Waste Facilities (NJAC 7:26-10.3) will be another location-specific ARAR for Alternatives A3, B3 and C3, as placement of the materials will be in Impound 8. This ARAR will be met for the Alternatives A3, B3 and C3 by specifying the

substantive requirements in the remedial action contract and by maintaining compliance with those requirements through remedial action monitoring. Alternatives A3, B3 and C3 will comply with the location-specific ARARs.

Action-specific ARARs identified for Alternatives A3, B3 and C3 include the NJDEP Technical Requirements for Site Remediation (NJAC 7:26E et. seq.) and Occupational Safety and Health Administration (OSHA) regulations. These ARARs will be met through specifying the substantive requirements in the remedial action contract and by monitoring compliance during inspection activities. Additional action-specific ARARs will be triggered for Alternatives A3, B3 and C3 due to material excavation, conditioning and/or treatment, and placement in Impound 8. These ARARs will include New Jersey Air Regulations; Stream Encroachment and Sediment Control (SESC) requirements; New Jersey Hazardous Waste Regulations related to residual waste disposal; Department of Transportation (DOT) transport requirements; RCRA regulations pertaining to Impound 8 for placement of material for all categories (closure, post-closure and ground water monitoring); cultural resources and stream encroachment. These ARARs will also be met through specification of the substantive requirements in the remedial action contract documents and during remedial action monitoring to maintain compliance. Alternatives A3, B3 and C3 will meet action specific ARARs.

In addition to state location and action-specific ARARs, the following are Federal ARARs for all alternatives except no action alternatives for all material categories: The Clean Air Act (CAA), New Source Performance Standards (NSPS), National Ambient Air Quality Standards (NAAQS), the National Historic Preservation Act and the Section 404 of the Clean Water Act (for wetlands). These ARARs will be met by specifying the substantive requirements in the remedial design/remedial action contract and by maintaining compliance with those requirements through remedial action monitoring.

Category D Material: Non Hazardous Material

No chemical-specific ARARs are identified for the 4 alternatives as Category D material is classified as non-hazardous. Alternative D4 is subject to New Jersey Flood Hazard Control Act Regulations (NJAC and:13-1 et. seq.). This ARAR will be met by having on-site work conducted in Flood plain areas consistent with substantive permit regulations.

The 1988 ACO, NJDEP Technical Requirements for Site Remediation (NJAC 7:26E et. seq.) and OSHA regulations as well as New Jersey SESC, DOT transport requirements, and New Jersey air control regulations, are potentially applicable action-specific ARARs for Alternative D4. These ARARs, as applicable, will be met by specifying and monitoring activities so that they are in compliance with the substantive requirements of these regulatory programs.

Category E Material: General Plant Debris

No chemical specific ARARs are identified for Alternative E2.

The New Jersey Flood Hazards Control Act Regulations (NJAC 7:13-1 et. seq.) are a location-specific ARAR associated with Alternative E2. On-site work conducted in Flood plain areas will be consistent with substantive permit requirements.

Action-specific ARARs identified for Alternative E2 include the 1988 ACO, NJDEP Technical Requirements for Site Remediation (NJAC 7:26E et. seq.) and OSHA regulations, as well as New Jersey SESC requirements and DOT transport requirements. Remedial actions comprising Alternative E2 will be conducted in accordance with these action-specific ARARs. Alternative E2 will attain action-specific ARARs.

Cost-Effectiveness

The cost effectiveness of a remedy is determined by weighing the cost against the alternative's ability to achieve ARARs and remedial action objectives. The selected remedy is cost effective as it has been determined to provide the greatest overall long-term and short-term effectiveness in proportion to its present worth cost, (i.e., alternative A3, \$30,000,000; alternative B3, \$33,000,000; alternative C3, \$10,000,00; alternative D4, \$1,800,000; and alternative E2, \$800,000). Although certain alternatives may be less costly, these alternatives are rejected because they do not best fit the nine balancing criteria.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner at the Site. It further provides the best balance of trade-offs with respect to the nine evaluation criteria. The alternatives outlined in this ROD are the most cost-effective permanent remedy.

Preference for Treatment as a Principal Element

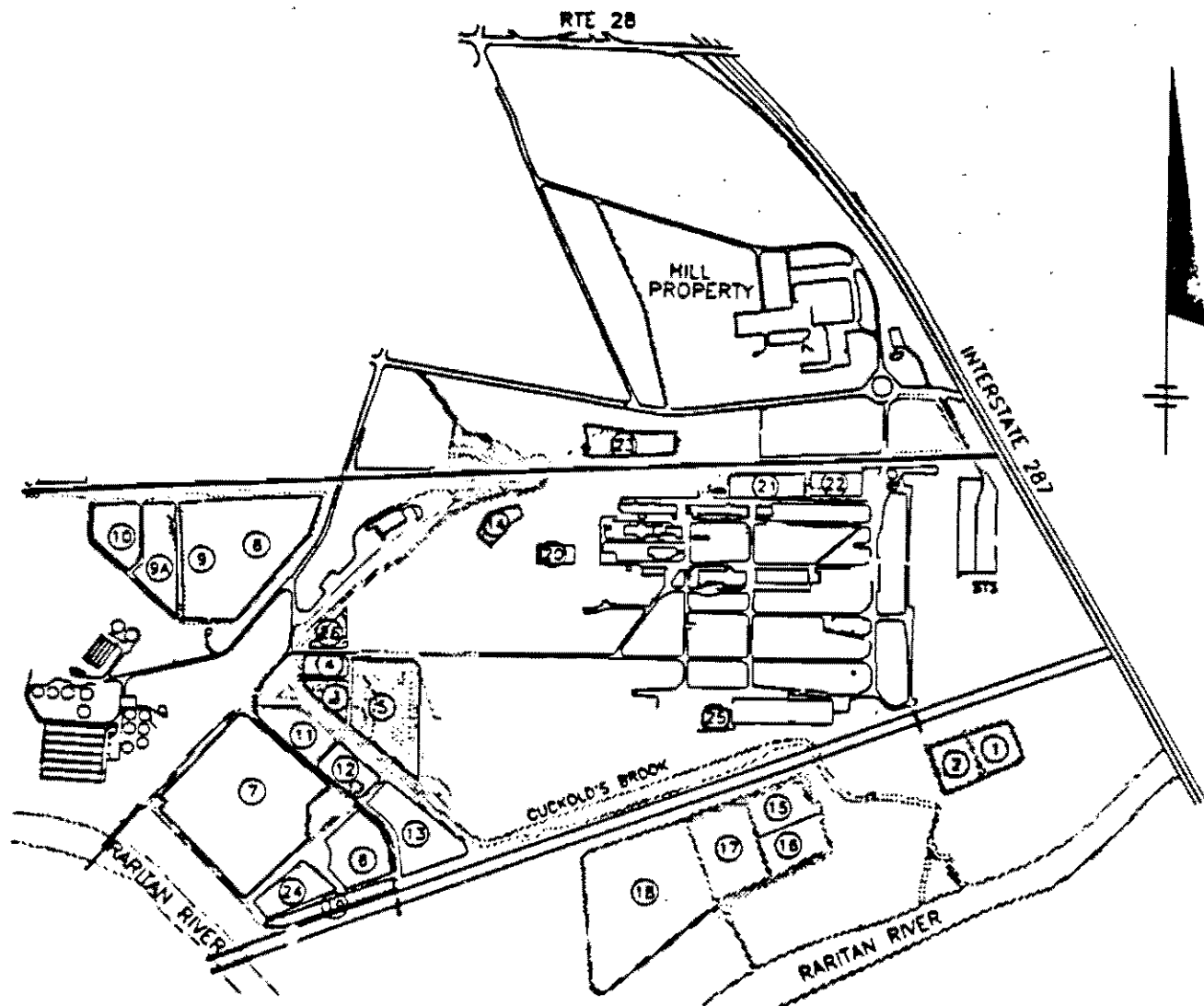
The preference for treatment as a principal element has been satisfied by treating contaminated sludge material using LTTT and solid phase bio-treatment processes.

DOCUMENTATION OF SIGNIFICANT CHANGES

There is no change from the Preferred Remedy described in the Proposed Plan and the Selected Remedy described in this ROD.

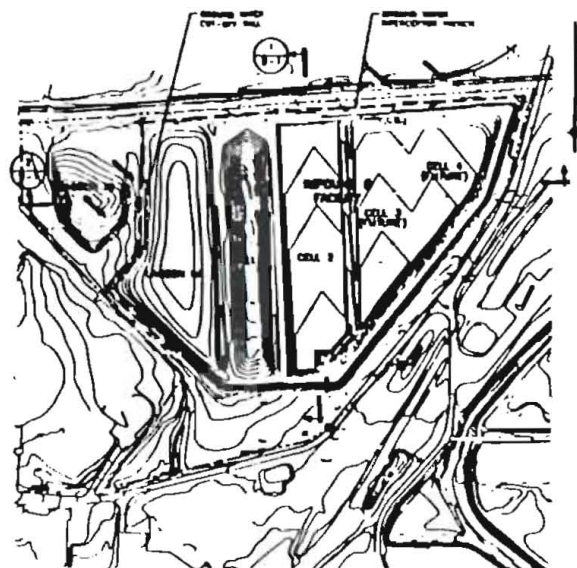
APPENDIX I

FIGURES



NOT TO SCALE

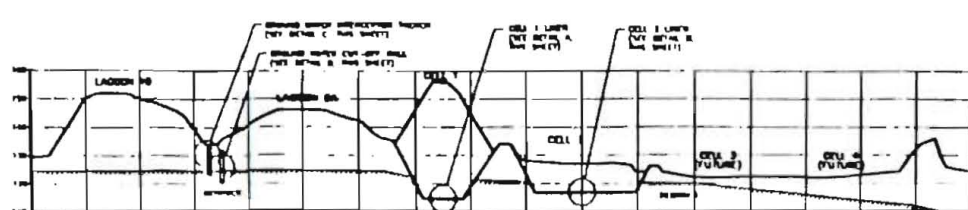
FIGURE 1
AMERICAN CYANAMID/AMERICAN HOME PRODUCTS SITE
BRIDGEWATER TOWNSHIP, SOMERSET COUNTY, NEW JERSEY
SITE PLAN



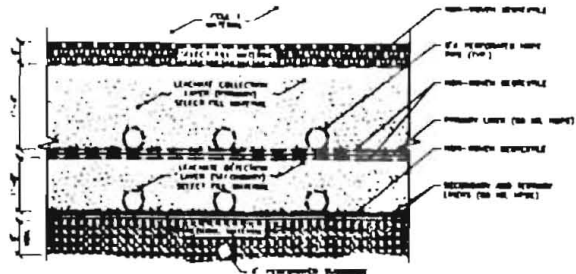
LEGEND
 --- PROPERTY LINE
 --- EXISTING DRAINAGE
 --- EXISTING DRAINAGE WITH FLOOD DIRECTION
 --- EXISTING DRAINAGE WITH FLOOD DIRECTION
 --- EXISTING DRAINAGE WITH FLOOD DIRECTION



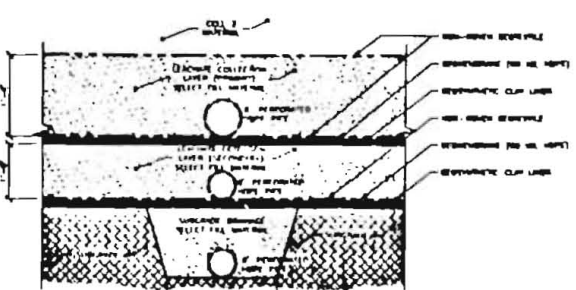
SECTION A-A
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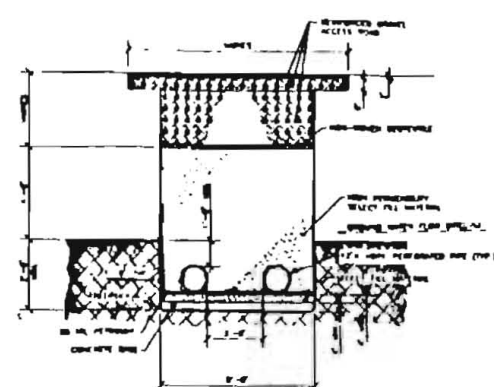
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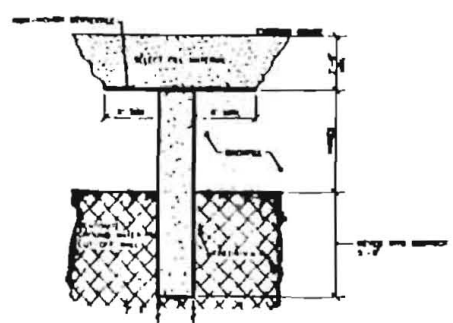
SECTION C-C
 NOT TO SCALE



SECTION D-D
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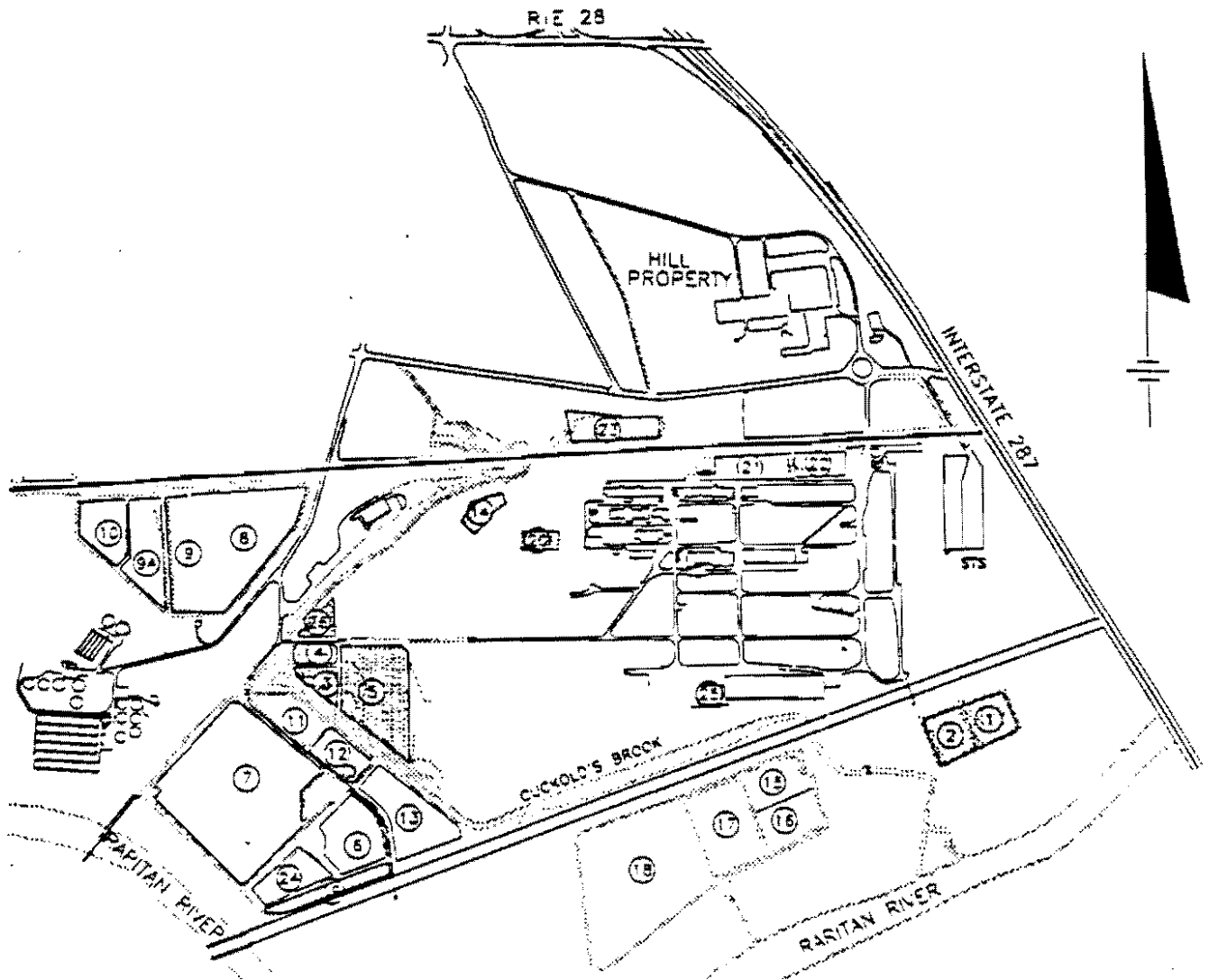
SECTION E-E
 NOT TO SCALE



SECTION F-F
 NOT TO SCALE

FIGURE 2
 American Cyanamid Site
 American Home Products Corporation
 Bridgewater Township, Somerset County, NJ
 Impoundment 8 Facility--Plan and Sections

FIGURE 2-2



AMERICAN CYANAMID COMPANY
GROUP III IMPOUNDMENTS

NOT TO SCALE

APPENDIX II TABLES

Table 1
AMERICAN CYANAMID COMPANY, BOUND BROOK, NEW JERSEY
GROUP III CMS/FS

DATABASE SUMMARY FOR CONTAMINANT CONCENTRATIONS

WET WEIGHT								
mg/kg	Impoundment 1				Impoundment 2			
	Min	Max	Mean	Detects	Min	Max	Mean	Detects
Volatiles								
Acetone					1,000.0	15,000.0	8,000.0	2 of 2
Benzene	44,000.0	50,000.0	47,000.0	2 of 2	4,700.0	9,000.0	6,850.0	2 of 2
Carbon Disulfide	670.0	1,800.0	1,235.0	2 of 2	770.0	770.0	770.0	1 of 2
Chloromethane					260.0	260.0	260.0	1 of 2
Ethylbenzene	1,400.0	2,900.0	2,150.0	2 of 2	2,300.0	2,300.0	2,300.0	1 of 2
Methylene Chloride	330.0	440.0	385.0	2 of 2				
Toluene	12,000.0	17,000.0	14,500.0	2 of 2	2,700.0	4,600.0	3,650.0	2 of 2
Xylenes (total)	2,400.0	30,000.0	16,200.0	2 of 2	29,000.0	29,000.0	29,000.0	1 of 2
Base/Neutral Compounds								
1,3-dichlorobenzene	8.2	22.0	15.0	2 of 2	58.0	150.0	104.0	2 of 2
1,4-dichlorobenzene	38.0	110.0	74.0	2 of 2	330.0	870.0	600.0	2 of 2
1,2-dichlorobenzene	530.0	1,600.0	1,065.0	2 of 2	910.0	3,100.0	2,005.0	2 of 2
2-chloronaphthalene	48.0	48.0	48.0	1 of 2				
2-methylnaphthalene	67.0	280.0	173.5	2 of 2	390.0	1,500.0	945.0	2 of 2
dibenzofuran	8.2	37.0	22.6	2 of 2				
acenaphthylene								
acenaphthene					110.0	430.0	270.0	2 of 2
fluorene					1,700.0	7,000.0	4,350.0	2 of 2
naphthalene	1,100.0	4,100.0	2,600.0	2 of 2	5,200.0	21,000.0	13,100.0	2 of 2
nitrobenzene	430.0	4,800.0	2,615.0	2 of 2	460.0	460.0	460.0	1 of 2
phenanthrene	67.0	67.0	67.0	1 of 2				
pyrene								
Acid-Extractable Compounds								
2,4-dimethylphenol	32.0	32.0	32.0	1 of 2				
benzoic acid	58.0	58.0	58.0	1 of 2				
CB's								
PCB-1260								
Inorganics								
Aluminum				N/A				N/A
Antimony				N/A				N/A
Arsenic				N/A				N/A
Barium				N/A				N/A
Beryllium				N/A				N/A
Cadmium				N/A				N/A
Calcium				N/A				N/A
Chromium				N/A				N/A
Cobalt				N/A				N/A
Copper				N/A				N/A
Cyanide				N/A				N/A
Iron				N/A				N/A
Lead				N/A				N/A
Magnesium				N/A				N/A
Manganese				N/A				N/A
Mercury				N/A				N/A
Nickel				N/A				N/A
Potassium				N/A				N/A
Selenium				N/A				N/A
Silver				N/A				N/A
Sodium				N/A				N/A
Vanadium				N/A				N/A
Zinc				N/A				N/A

Note: Mean calculations determined using Sum of detected concentrations / Number of detections

Items left blank indicate that contaminants were not detected, N/A = Not Analyzed

Unless otherwise noted, the results are presented on a "dry-weight" basis.

This table is a retyped version of Table 17 from the Group III CMS/FS, May 1994 (Blasland, Bouck & Lee)

Table 1
AMERICAN CYANAMID COMPANY, BOUND BROOK, NEW JERSEY
GROUP III CMS/FS

DATABASE SUMMARY FOR CONTAMINANT CONCENTRATIONS

mg/kg	DRY WEIGHT							
	Impoundment 1				Impoundment 2			
	Min	Max	Mean	Detects	Min	Max	Mean	Detects
Volatiles								
Acetone								
Benzene	1,800.0	270,000.0	137,266.7	3 of 3	43,000.0	87,000.0	65,000.0	2 of 2
Carbon Disulfide								
Chloromethane								
Ethylbenzene								
Methylene Chloride								
Toluene	490.0	86,000.0	29,830.0	3 of 3	15,000.0	22,000.0	18,500.0	2 of 2
Xylenes (total)	88.0	10,000.0	5,044.0	2 of 3	2,440.0	2,400.0	2,400.0	1 of 2
Base/Neutral Compounds								
1,3-dichlorobenzene								
1,4-dichlorobenzene								
1,2-dichlorobenzene	440.0	2,200.0	1,600.0	3 of 3	430.0	490.0	450.0	3 of 3
2-chloronaphthalene					4,500.0	5,200.0	4,766.7	3 of 3
2-methylnaphthalene	180.0	180.0	180.0	1 of 3	180.0	180.0	180.0	1 of 3
dibenzofuran	71.0	510.0	240.3	3 of 3	690.0	890.0	790.0	3 of 3
acenaphthylene	220.0	220.0	220.0	1 of 3				
acenaphthene								
fluorene	450.0	2,600.0	1,266.7	3 of 3	300.0	300.0	300.0	1 of 3
naphthalene	1,100.0	8,500.0	3,266.7	3 of 3	2,700.0	3,600.0	3,200.0	3 of 3
nitrobenzene	300.0	1,500.0	843.3	3 of 3	8,700.0	11,000.0	10,500.0	3 of 3
phenanthrene	68.0	68.0	68.0	1 of 3	100.0	250.0	193.3	3 of 3
pyrene	28.0	28.0	28.0	3 of 3	110.0	130.0	120.0	3 of 3
Acid-Extractable Compounds								
2,4-dimethylphenol								
benzoic acid								
PCB's								
PCB-1260	2.7	5.2	4.1	3 of 3	2.2	3.5	2.9	3 of 3
Inorganics								
Aluminum	290.0	619.0	422.67	3 of 3	195.00	333.00	263.00	3 of 3
Antimony								
Arsenic	0.29	3.74	2.11	3 of 3	4.18	24.40	13.13	3 of 3
Barium	<3.57	16.40	16.40	2 of 3	16.00	62.30	31.50	3 of 3
Beryllium								
Cadmium								
Calcium	<238	1,120.00	1,120.00	2 of 3	179.00	279.00	215.67	3 of 3
Chromium	15.30	36.90	18.53	3 of 3	7.32	11.40	9.91	3 of 3
Cobalt								
Copper	20.30	34.80	28.40	3 of 3	19.60	29.80	24.30	3 of 3
Cyanide								
Iron	1,600.00	10,600.00	4,753.33	3 of 3	709.00	1,210.00	902.33	3 of 3
Lead	60.50	100.00	86.50	3 of 3	99.50	127.00	116.83	3 of 3
Magnesium	<189	326.00	326.00	1 of 3				
Manganese	15.70	57.00	30.10	3 of 3	6.28	10.00	7.89	3 of 3
Mercury	0.24	0.96	0.68	3 of 3	1.11	2.58	1.74	3 of 3
Nickel	10.00	25.60	19.53	3 of 3	<6.45	9.14	9.14	1 of 3
Potassium								
Selenium	3.79	3.92	3.87	3 of 3	8.58	13.80	10.89	3 of 3
Silver	<1.89	3.31	3.31	1 of 3				
Sodium	2,150.00	4,990.00	3,353.33	3 of 3	4,500.00	7,350.00	5,870.00	3 of 3
Vanadium								
Zinc	<3.77	9.27	9.27	1 of 3	9.98	21.50	14.29	3 of 3

Note: Mean calculations determined using Sum of detected concentrations / Number of detections

Items left blank indicate that contaminants were not detected. N/A = Not Analyzed

Unless otherwise noted, the results are presented on a "dry-weight" basis.

This table is a retyped version of Table 17 from the Group III CMS/FS, May 1994 (Blasland Bouck & Lee)

Table 1
AMERICAN CYANAMID COMPANY, BOUND BROOK, NEW JERSEY
GROUP III CMS/FS
DATABASE SUMMARY FOR CONTAMINANT CONCENTRATIONS

mg/kg	Impoundment 3				Impoundment 4 (1)			
	Min	Max	Mean	Detects	Min	Max	Mean	Detects
VOCs								
Methylene Chloride	37.00	37.00	37.00	1 of 5	ND	11.00	3.87	1 of 3
Acetone					38.00	38.00	38.00	1 of 3
1,1-dichloroethane								
1,2-dichloroethane								
1,1,1-trichloroethane								
1,1,2-trichloroethane								
2-butanone					15.00	15.00	15.00	1 of 3
4-methyl-pentanone					1.8J	1.8J	1.8J	1 of 3
Trans-1,2-dichloroethane								
Benzene	44.00	1,000.00	285.80	5 of 5	2,800.00	20,000.00	12,833.33	3 of 3
Carbon disulfide	7.80	7.80	7.80	1 of 5		25.00	8.30	1 of 3
Chloroform	7.50	7.50	7.50	1 of 5	ND	7.8J	3.80	1 of 3
Tetrachloroethane					ND	7.8J	3.80	1 of 3
Toluene	15.00	370.00	148.80	5 of 5	710.00	8,100.00	3,838.67	3 of 3
Trichloroethylene								
Ethylbenzene	8.10	18.00	12.13	3 of 5	72.00	320.00	210.67	3 of 3
Chlorobenzene	8.80	13.00	11.30	2 of 5	28.00	130.00	82.67	3 of 3
Xylenes (total)	8.80	180.00	78.20	4 of 5	800.00	3,500.00	2,050.00	2 of 3
SEMI-VOLATILES								
4-chloronitro					780.00	780.00	780.00	1 of 3
1,4-dichlorobenzene	5.00	58.00	32.25	4 of 5	ND	1,100.00J	379.67	2 of 3
1,3-dichlorobenzene	5.40	10.00	7.17	3 of 5	ND	180.00J	43.05	2 of 3
1,2-dichlorobenzene	16.00	370.00	180.80	5 of 5	ND	8,200.00	2,838.67	2 of 3
2,4-dinitrotoluene					ND	4,200.00	1,400.00	1 of 3
2,6-dinitrotoluene					ND	22,000.00	7,337.33	1 of 3
2-chloronaphthalene								
2-methylnaphthalene	58.00	280.00	185.40	5 of 5				
Nitrobenzene	4.10	15.00	9.72	5 of 5	ND	1,300.00	530.00	2 of 3
1,2,4-trichlorobenzene	2.20	2.70	2.45	2 of 5				
benzoic acid	100.00	100.00	100.00	1 of 5				
di-n-butyl-phthalate					ND	3.0J	1.00	1 of 3
di-n-octyl-phthalate	6.80	8.90	8.90	1 of 5				
di-benzofuran	5.70	40.00	19.48	5 of 5	12J	12J	12J	1 of 3
benzo(a)anthracene	5.40	9.70	8.03	3 of 5				
butylbenzylphthalate								
chrysene	5.30	5.30	5.30	1 of 5				
bis(2-ethylhexyl)phthalate	12.00	12.00	12.00	1 of 5				
benzo(b)fluoranthene	4.80	4.80	4.80	1 of 5				
benzo(k)fluoranthene								
benzo(a)pyrene	3.20	3.20	3.20	1 of 5				
2-chlorophenol					ND	10,000.00	3,333.33	1 of 3
Indeno(1,2,3-cd)pyrene								
naphthalene	720.00	880.00	802.00	5 of 5	330.00	20,000.00	11,443.33	3 of 3
acenaphthene	15.00	48.00	33.00	3 of 5	ND	150.00	50.00	1 of 3
acenaphthylene	13.00	17.00	15.00	2 of 5	ND	700.00	233.33	3 of 3
fluorene	51.00	150.00	113.67	3 of 5	ND	3,800.00	1,266.67	1 of 3
anthracene	7.80	10.00	8.90	2 of 5	ND	880.00	301.33	2 of 3
fluoranthene	3.30	20.00	8.78	5 of 5				
phenanthrene	9.40	42.00	25.28	5 of 5	ND	280.00	100.33	2 of 3
pyrene	3.00	22.00	8.30	5 of 5				
vinylchlorobenzene								
diethylphthalate								
dimethylphthalate								
n-nitrosodiphenylamine	14.00	83.00	38.00	4 of 5				
2,4-dimethylphenol								
2-methylphenol	2.00	3.00	2.50	2 of 5				
4-methylphenol								
4-nitroanisole	27.00	38.00	32.50	2 of 5				
phenol								
PCBs (total)								
PCB Aroclor-1242								
PCB Aroclor-1254								
PCB Aroclor-1260	5.40	5.40	5.40	1 of 5				
INORGANICS								
Aluminum	7,050.00	18,800.00	4,838.00	5 of 5				
Antimony	4.88	17.40	10.73	3 of 5				
Arsenic	4.10	10.30	6.58	5 of 5	ND	101.00	50.50	1 of 3
Barium	115.00	882.00	285.20	5 of 5				
Beryllium	0.34	0.84	0.88	3 of 5				
Cadmium	0.48	0.48	0.48	1 of 5				
Calcium	2,430.00	10,500.00	5,324.00	5 of 5				
Chromium	84.20	1,540.00	472.58	5 of 5	14.00	14.00	14.00	2 of 3
Cobalt	5.00	17.00	11.85	5 of 5				
Copper	34.80	812.00	388.48	5 of 5	4.30	20.30	12.30	2 of 3
Cyanide	7.10	312.00	130.00	3 of 5				
Iron	25,700.00	38,500.00	30,020.00	5 of 5				
Lead	88.80	4,880.00	1,035.72	5 of 5	8.00	18.10	11.05	2 of 3
Magnesium	2,620.00	8,840.00	3,872.00	5 of 5				
Manganese	184.00	1,180.00	579.40					
Mercury	0.31	2.00	1.48	5 of 5	ND	0.18	0.08	2 of 3
Nickel	28.80	85.80	44.32	5 of 5	2.00	5.38	3.85	2 of 3
Potassium	640.00	2,280.00	1,208.80	5 of 5				
Selenium	0.31	0.48	0.40	2 of 5	0.08	1.80	0.88	2 of 3
Silver	29.30	29.30	29.30	1 of 5				
Sodium	875.00	17,300.00	4,875.80	5 of 5				
Thallium								
Vanadium	27.80	42.20	38.42	5 of 5				
Zinc	185.00	2,470.00	783.20	5 of 5	5.80	35.10	20.45	2 of 3

NOTES:

- (1) The Pumpable tars from Impoundment 4 have been removed and blended in an on-site hazardous waste fuel blending/recycling facility.
 - (2) The sludge portion detects of Impoundment 5 contents are presented because they represent the highest concentrations. Therefore, these concentrations pose the greatest potential risk.
 - (3) Data derived from O'Brien & Gere 1984 Priority Pollutant test results and BBL 06/18/91 test results. No SVOCs detected in either sampling event.
- ND - not detected. J - compound is present in a concentration below the minimum detection limit (MDL). The reported value is estimate.
- Unless otherwise noted, the results are presented on a "dry-weight" basis.
- This table is a retyped version of Table 2.3.1 from the Group III CMS/FS, May 1986 (Blaisland, Bouck & Lee)

R2-0002202

Table 1
AMERICAN CYANAMID COMPANY, BOUND BROOK, NEW JERSEY
GROUP III CMS/FS
DATABASE SUMMARY FOR CONTAMINANT CONCENTRATIONS

mg/kg	Impoundment 5 (sludge) (2)				Impoundment 14			
	Min	Max	Mean	Detects	Min	Max	Mean	Detects
VOLATILES								
Methylene Chloride	0.52	530.00	112.52	8 of 14	ND	18.00	7.50	1 of 2
Acetone	1.70	9,900.00	1,065.67	7 of 14				
1,1-dichloroethene	0.56	0.56	0.56	1 of 14				
1,2-dichloroethene	110.00	110.00	110.00	1 of 14				
1,1,1-trichloroethene	0.56	0.56	0.56	1 of 14				
1,1,2-trichloroethene	0.83	0.83	0.83	1 of 14				
2-butanone								
4-methyl-pentanone								
Trans-1,2-dichloroethene	0.66	0.66	0.66	1 of 14				
Benzene	25.00	82,000.00	10,070.78	9 of 14	610.00	1,300.00	866.00	2 of 2
Carbon disulfide								
Chloroform	18.00	26,000.00	4,080.00	7 of 14	ND	78.00	39.00	1 of 2
Tetrachloroethene								
Toluene	69.00	36,000.00	4,781.00	8 of 14	1,200.00	1,300.00	1,250.00	2 of 2
Trichloroethylene	0.83	0.83	0.83	1 of 14				
Ethylbenzene	7.40	410.00	119.05	8 of 14	ND	120	60	1 of 2
Chlorobenzene	8.00	440.00	134.75	8 of 14	1,400.00	3,200.00	2,300.00	2 of 2
Xylenes (total)	62.00	28,000.00	3,518.67	9 of 14	820.00	1,400.00	1,180.00	2 of 2
SEMI-VOLATILES								
4-chloroaniline								
1,4-dichlorobenzene	21.00	73.00	36.83	8 of 14				
1,3-dichlorobenzene	7.50	13.00	10.17	3 of 14				
1,2-dichlorobenzene	130.00	890.00	308.89	9 of 14				
2,4-dinitrotoluene	22.00	22.00	22.00	1 of 14				
2,6-dinitrotoluene								
2-chloronaphthalene	8.60	220.00	112.15	4 of 14	ND	24.00	12.00	1 of 2
2-methylnaphthalene	19.00	8,100.00	3,898.78	8 of 14				
1-benzene	540.00	54,000.00	10,375.56	9 of 14	ND	1,800.00	800.00	1 of 2
1,2,4-trichlorobenzene								
benzoic acid								
di-n-butyl-phthalate								
di-n-octyl-phthalate								
di-benzofuran	210.00	880.00	376.25	8 of 14				
benzo(a)anthracene	32.00	200.00	118.43	7 of 14				
butylbenzylphthalate					ND	5.80	2.95	1 of 2
chrysene	14.00	24.00	18.33	3 of 14				
benz(2-ethylthyl)phthalate	18.00	44.00	27.00	4 of 14				
benzo(b)fluoranthene	19.00	27.00	24.00	3 of 14				
benzo(k)fluoranthene								
benzo(a)pyrene					ND	10,000.00	5,000.00	1 of 2
2-chlorophenol								
Indeno(1,2,3-cd)pyrene					ND	7,800.00	3,800.00	1 of 2
naphthalene	3,300.00	420,000.00	56,255.56	9 of 14	ND			
acenaphthene	60.00	1,400.00	463.36	8 of 14				
acenaphthylene	9.00	32.00	20.00	4 of 14				
fluorene	23.00	3,500.00	736.63	8 of 14	ND	250.00	125.00	1 of 2
anthracene	33.00	150.00	107.14	7 of 14	ND	2,000	1.00	1 of 2
fluoranthene	17.00	130.00	86.29	7 of 14				
phenanthrene	110.00	880.00	387.78	9 of 14				
pyrene	24.00	140.00	84.50	8 of 14				
trichlorobenzene					ND	31.00	15.50	1 of 2
diethylphthalate					ND	200.00	100.00	1 of 2
dimethylphthalate								
n-nitrosodiphenylamine	180.00	14,000.00	4,360.00	9 of 14				
2,4-dimethylphenol	70.00	180.00	130.00	2 of 14				
2-methylphenol	42.00	820.00	239.00	3 of 14				
4-methylphenol	160.00	280.00	227.50	4 of 14				
4-nitroaniline								
phenol	150.00	310.00	225.00	4 of 14				
PCBs (total)								
PCB Aroclor-1242	44.00	79.00	61.50	2 of 12				
PCB Aroclor-1254								
PCB Aroclor-1260								
INORGANICS								
Aluminum	854.00	57,700.00	15,224.89	9 of 13	ND	33.00	18.60	1 of 2
Antimony	4.80	22.10	13.33	3 of 13	ND	101.00	50.50	1 of 2
Arsenic	6.30	63.10	26.69	8 of 13				
Barium	102.00	7,480.00	2,501.66	9 of 13				
Beryllium	0.36	1.80	0.99	2 of 13	ND	0.30	0.15	1 of 2
Cadmium	0.75	9.30	5.38	8 of 13	ND	1.30	0.65	1 of 2
Calcium	524.00	21,300.00	4,476.22	9 of 13				
Chromium	31.80	3,680.00	1,499.62	8 of 13	55.50	180.00	117.75	2 of 2
Cobalt	1.50	25.80	13.37	8 of 13				
Copper	163.00	3,020.00	1,894.44	9 of 13	64.40	730.00	387.20	2 of 2
Cyanide	12.10	51.30	25.96	7 of 13				
Iron	4,020.00	230,000.00	78,334.44	9 of 13				
Lead	49.50	2,930.00	1,314.39	8 of 13	48.40	320.00	183.20	2 of 2
Magnesium	157.00	4,880.00	1,883.33	9 of 13				
Manganese	134.00	800.00	361.66	9 of 13				
Mercury	4.50	189.00	82.27	9 of 13	ND	40.00	20.00	1 of 2
Nickel	53.00	484.00	224.67	9 of 13	14.30	58.00	38.15	2 of 2
Potassium	352.00	1,170.00	575.88	9 of 13				
Selenium	0.36	6.10	2.00	8 of 13	0.02	2.40	1.21	2 of 2
Silver	2.00	3.90	3.30	8 of 13	ND	0.30	0.15	1 of 2
Sodium	1,040.00	13,000.00	8,514.44	9 of 13				
Thallium								
Vanadium	2.80	70.80	34.64	9 of 13				
Zinc	115.00	3,180.00	836.78	9 of 13	272.00	810.00	541.00	2 of 2

NOTES:

- The Pumpable tars from Impoundment 4 have been removed and blended in an on-site hazardous waste fuel blending/recycling facility.
 - The sludge portion detects of Impoundment 5 contents are presented because they represent the highest concentrations. Therefore, these concentrations pose the potential risk.
 - Data derived from O'Brien & Gere 1984 Priority Pollutant test results and BBL 06/18/91 test results. No SVOCs detected in either sampling event.
- ND - not detected. J - compound is present in a concentration below the minimum detection limit (MDL). The reported value is estimate.
- Unless otherwise noted, the results are presented on a "dry-weight" basis.
- This table is a retyped version of Table 2.3.1 from the Group III CMS/FS, May 1996 (Bisland, Bouck & Lee)

R2-0002203

Table 1
AMERICAN CYANAMID COMPANY, BOUND BROOK, NEW JERSEY
GROUP III CHS/FS
DATABASE SUMMARY FOR CONTAMINANT CONCENTRATIONS

mg/kg	Impoundment 20 (5)				Impoundment 28			
	Min	Max	Mean	Detects	Min	Max	Mean	Detects
VOLATILES								
Methylene Chloride	110.00	180.00	126.00	2 of 2	0.01	0.40	0.15	3 of 4
Acetone					0.06	9.80	2.37	3 of 4
1,1-dichloroethene								
1,2-dichloroethene								
1,1,1-trichloroethene								
1,1,2-trichloroethene								
2-butanone								
4-methyl-pentanone								
Trans-1,2-dichloroethane								
Benzene	1,800.00	5,500.00	3,633.33	3 of 3	0.04	830.00	84.86	4 of 4
Carbon Disulfide								
Chloroform								
Tetrachloroethene								
Toluene					0.02	1,400.00	484.54	3 of 4
Trichloroethylene								
Ethylbenzene	220.00	880.00	400.00	3 of 3	0.004	270.00	81.00	3 of 4
Chlorobenzene	250.00	3,000.00	1,519.87	3 of 3	0.003	280.00	87.10	3 of 4
Xylenes (total)	880.00	2,800.00	1,753.33	3 of 3	10.00	580.00	285.00	2 of 4
SEMI-VOLATILES								
4-chlorophenol								
1,4-dichlorobenzene					25.00	25.00	25.00	1 of 5
1,3-dichlorobenzene					4.50	4.50	4.50	1 of 5
1,2-dichlorobenzene					4.20	230.00	84.40	3 of 5
2,4-dinitrotoluene								
2,6-dinitrotoluene								
2-chloronaphthalene					35.00	36.00	35.00	1 of 5
2-methylnaphthalene					3.80	22.00	15.53	3 of 5
nitrobenzene					5.70	9.80	7.80	2 of 5
1,2,4-trichlorobenzene					8.40	8.40	8.40	1 of 5
benzoic acid								
di-n-butyl-phthalate								
di-n-octyl-phthalate								
diisobutylfuran					1.80	6.70	5.47	3 of 5
benzo(a)anthracene					5.20	880.00	330.55	4 of 5
butylbenzylphthalate								
chrysene					8.80	21.00	15.30	2 of 5
bis(2-ethylhexyl)phthalate					4.80	26.00	14.78	4 of 5
benzo(b)fluoranthene								
benzo(k)fluoranthene								
benzo(a)pyrene								
7-chlorophenol								
indeno(1,2,3-cd)pyrene								
naphthalene					26.00	170.00	68.25	4 of 5
acenaphthene					14.00	14.00	14.00	1 of 5
acenaphthylene								
fluorene					81.00	81.00	81.00	1 of 5
anthracene					5.00	5.00	5.00	1 of 5
fluoranthene					2.00	4.40	3.20	2 of 5
pyrene					8.00	17.00	10.50	2 of 5
trichlorobenzene					1.50	3.40	2.45	2 of 5
diethylphthalate								
dimethylphthalate								
4-nitrodiphenylamine					26.00	460.00	145.00	4 of 5
2,4-dimethylphenol								
2-methylphenol					10.00	10.00	10.00	1 of 5
4-methylphenol					5.00	30.00	17.50	2 of 5
4-nitroaniline					21.00	21.00	21.00	1 of 5
phenol								
PCBs (total)								
PCB Aroclor-1242								
PCB Aroclor-1254					5.70	5.70	5.70	1 of 5
PCB Aroclor-1280								
INORGANICS								
Aluminum	3,130.00	3,420.00	3,275.00	2 of 2	3,740.00	12,500.00	8,415.00	4 of 4
Antimony	36.00	683.00	381.30	3 of 3	7.70	43.80	28.15	4 of 4
Arsenic	6.26	8.40	7.33	2 of 2	3.40	43.80	28.10	4 of 4
Barium	39.80	40.50	39.55	2 of 2	577.00	2,840.00	1,788.25	4 of 4
Beryllium	1.30	1.39	1.33	2 of 2	0.80	0.80	0.80	1 of 4
Cadmium	1.50	2.03	1.81	3 of 3	7.70	81.30	24.83	4 of 4
Calcium	47,100.00	59,800.00	52,000.00	2 of 2	4,770.00	22,800.00	13,330.00	4 of 4
Chromium	1,800.00	64,400.00	34,033.33	3 of 3	57.10	286.00	174.28	4 of 4
Cobalt	21.80	27.80	24.55	2 of 2	11.08	125.00	52.05	4 of 4
Copper	1,800.00	8,270.00	5,736.67	3 of 3	884.00	5,280.00	2,538.00	4 of 4
Cyanide	2.80	2.72	2.86	2 of 2	1.50	2.30	1.85	3 of 4
Iron	44,800.00	33,500.00	49,080.00	2 of 2	20,800.00	112,000.00	64,775.00	4 of 4
Lead	1,000.00	1,980.00	1,480.00	3 of 3	888.00	38,200.00	10,817.00	4 of 4
Magnesium	4,280.00	4,840.00	4,545.00	2 of 2	1,880.00	11,800.00	6,705.00	4 of 4
Manganese	382.00	412.00	367.00	2 of 2	347.00	1,380.00	888.25	4 of 4
Mercury	0.27	1.18	0.85	3 of 3	2.10	4.80	3.23	4 of 4
Nickel	240.00	482.00	378.67	3 of 3	88.30	828.00	308.33	4 of 4
Potassium	1,170.00	1,230.00	1,200.00	3 of 2	372.00	1,280.00	809.75	4 of 4
Selenium	0.03	1.39	0.80	3 of 3	1.40	7.80	3.10	4 of 4
Silver	0.20	2.72	1.84	3 of 3	3.70	21.70	13.05	4 of 4
Sodium	8,200.00	10,800.00	10,000.00	2 of 2	3,380.00	8,470.00	4,485.00	4 of 4
Thallium	2.18	2.72	2.44	2 of 2	1.20	1.20	1.20	1 of 4
Vanadium	100.00	107.00	103.50	2 of 2	17.10	81.80	42.35	4 of 4
Zinc	13,800.00	148,000.00	60,800.00	2 of 2	1,030.00	5,820.00	3,085.00	4 of 4

NOTES:

- (1) The Pumpable tars from Impoundment 4 have been removed and blended in an on-site hazardous waste fuel blending/recycling facility.
 - (2) The sludge portion detects of Impoundment 5 contents are presented because they represent the highest concentrations. Therefore, these concentrations pose the greatest potential risk.
 - (3) Data derived from O'Brien & Gere 1984 Priority Pollutant test results and BBL 05/18/91 test results. No SVOCs detected in either sampling event.
- ND - not detected
J - compound is present in a concentration below the minimum detection limit (MDL). The reported value is estimate.
Unless otherwise noted, the results are presented on a "dry-weight" basis.
This table is a retyped version of Table 2.3.1 from the Group III CHS/FS, May 1996 (Blasland, Bouck & Lee)

Treatment Objectives for Bioremediation (Impoundments 4, 5, 14, 20 and 26)

Compound of Concern	Average Treatment Objective (mg/kg)	Maximum Treatment Objective (mg/kg)
Benzene	54	60
Toluene	145	145
Xylene	180	230
Naphthalene	12,000	13,100
Nitrobenzene	3,360	5,200
1,2-dichlorobenzene	250	320
N-nitrosodiphenylamine	12,000	14,300
2-methylnaphthalene	1,760	1,900

Treatment Objectives for Low Temperature Thermal Treatment (LTTT) (Impoundments 1, 2 and 3)

Compound of Concern	Average Treatment Objective (mg/kg)	Maximum Treatment Objective (mg/kg)
Benzene	85	85
Toluene	200	200
Xylene	115	115
Naphthalene	550	670
Nitrobenzene	165	165
1,2-dichlorobenzene	200	200
N-nitrosodiphenylamine	5	5
2-methylnaphthalene	76	200

Note: Treatment objectives for metals will be RCRA leachate concentration levels based on the TCLP analysis.

TABLE 2
AMERICAN CYANAMID/AMERICAN HOME PRODUCTS SITE
BRIDGEWATER TOWNSHIP, SOMERSET COUNTY, NEW JERSEY
TREATMENT OBJECTIVES
GROUP III IMPOUNDMENTS (1, 2, 3, 4, 5, 14, 20 & 26)

SITE REMEDIATION SCHEDULE

RECORD OF DECISION GROUP III IMPOUNDMENTS AT AMERICAN CYANAMID SITE BRIDGEWATER TOWNSHIP, SOMERSET COUNTY

Task Name	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
RCRA-Lagoon 6	■											
Impound 8 Construction-Cell 3/4		■										
Impound 8 Construction-Cap												■
Group III			■	■	■	■	■	■	■			
Group II									■	■		
Group I											■	■

Appendix III

ADMINISTRATIVE RECORD INDEX
For The
RECORD OF DECISION
For
GROUP III IMPOUNDMENTS AT AMERICAN CYANAMID SITE
BRIDGEWATER TOWNSHIP, SOMERSET COUNTY

1. Lagoon 1 & 2 Characterization Report, O'Brien & Gere, October 1982.
2. Phase IV Report Source Assessment and Remedy Program, O'Brien & Gere, February 1983.
3. Monitoring Groundwater Impact on the Raritan River Report, Lawler, Matusky, & Skelly (LMS), October 1983.
4. Source Assessment and Remedy Program Final Report, O'Brien & Gere, December 1984.
5. Sludge Solidification Report for Lagoon 20, IT Corporation, November 1986.
6. Final Report on Continuous Monitoring Assessment Program for Lagoons 6,7,13,19, and 24, Camp Dresser & McKee (CDM), March 1983.
7. Ground water investigation and site-wide ground water model results, CDM 1985.
8. Continued assessment of ground water at Impoundments 17 and 18, CDM 1986.
9. New Jersey Pollutant Discharge Elimination System-Discharge to Ground Water (NJPDES/DGW) permit # NJ0002313, effective October 30, 1987.
10. Modification to the existing NJPDES/DGW permit # NJ0002313 issued on November 07, 1987 for the closure of Impoundment 8 facility (Impoundments 6,7,8 and 9A) under the authority of RCRA delegated to the New Jersey Department of Environmental Protection (NJDEP) from USEPA.
11. Continued assessment of ground water at Impoundments 6,7,13,19 and 24, CDM 1988.
12. NJDEP Approval Letter for "No Action" Closure of Lagoon 23, May 1988.
13. Administrative Consent Order (ACO) Signed by Cyanamid and NJDEP, May 1988.
14. Quality Assurance/Quality Control (QA/QC) Plan Submitted for Impoundment Characterization Program by Cyanamid, Blasland, Bouck & Lee (BB&L), September 1988.
15. Hazardous and Solid Waste Amendments (HSWA) permit I.D. # NJD0002173276 issued by USEPA on November 8, 1988.
16. Impoundment Characterization Program Sampling and Analysis Work Plan, BB&L, November 1988.
17. NJDEP Approval Letter for QA/QC Program for Impoundment Characterization, December 1988.
18. Berm Failure Prevention Plan, BB&L, February 1989.
19. Impoundments 11,20, and 26 Resource Conservation and Recovery Act (RCRA) Facility Investigation Work Plan, BB&L, February 1989.
20. NJDEP Community Relations Plan, February 1989.
21. NJDEP Approval Letter for Berm Failure Prevention Plan, March 1989.

22. NJDEP Approval Letter for Impoundments 11,20, and 26 RCRA Facility Investigation Work Plan, August 1989.

Impoundment Characterization Program Final Report, BB&L, January 1990.

24. NJDEP Approval Letter for Implementation of Fuel Blending Program as Interim Remedial Action for Lagoons 4 and 5, August 1990.
25. NJDEP Approval Letter for Impoundment Characterization Program Final Report, October 1990.
26. Impoundment Corrective Measure Study/Feasibility Study (CMS/FS) Work Plan, (BB&L), October 1990.
27. NJDEP Air Permit for Lagoon 4 & 5 Fuel Blending Program, October 1990.
28. NJDEP Stream Encroachment Permit for Lagoon 4 & 5, March 1991.
29. Amended Hill Property Remedial Investigation Report (RI), BB&L, March 1991.
30. NJDEP/USEPA Approval for Hill Property RI, April 1991.
31. NJDEP RCRA Permit Application Approval for Lagoons 4 & 5, June 1991.
32. Technology Evaluation Work Plan (TEWP) for Group I Impoundments, BB&L, July 1991.
33. NJDEP/USEPA Review and Concurrence Letter for TEWP-I, September 1991.
34. TEWP for Group II Impoundments, BB&L, December 1991.
35. NJDEP/USEPA Review and Concurrence Letter for TEWP-II, January 1992.
36. Amended Baseline Site-Wide Endangerment Assessment Report (Including Hill Property), BB&L, March 1992.
37. NJDEP/USEPA Approval Letter for Baseline Site-Wide Endangerment Assessment Report, April 1992.
38. Amended Soils RI/FS Work Plan, BB&L, May 1992.
39. Surface Soils Remedial/Removal Action (SSR/RA) Plan, BB&L, July 21, 1992.
40. A Work Plan for Coal Pile Removal to Impoundment 8 Facility, Cyanamid, August 13, 1992.
41. Hazardous Waste Site Safety and Health Program, Cyanamid, August 31, 1992 (prepared on 07/20/88).
42. CMS/FS report for Group 1 Impoundments, BB&L, October 1992.
43. NJDEP/USEPA approval letter for Group 1 Impoundments CMS/FS report, October 29, 1992.
44. Relocation of Production Wells from Hill Property to Manufacturing Area, Ground Water Modeling Report, CDM, October 1992.
45. Surface Soil Removal/Remedial Action Final Report, BB&L, March 5, 1993.
46. Superfund Proposed Plan for Group I Impoundments, June 30, 1993.
47. Draft Modified HSWA permit I.D # NJD002173276, June 30, 1993.
48. Transcript for August 5, 1993 Public Meeting/Hearing for the Group I Impoundments (11, 13, 19 & 24) Proposed Plan and Draft Modified HSWA Permit.

49. Record of Decision for Group I Impoundments (11, 13, 19 and 24), NJDEP, September 28, 1993.
50. Phase IA Cultural Resource Reconnaissance Report, The Cultural Resource Consulting Group, Revised September 1993.
51. Final HSWA Modified Permit for Group I Impoundments (11, 13, 19 and 24), USEPA, March 4, 1994.
52. Addendum to Final Design Report-Impoundment 8 East Liner Design Modifications, March 1994, BB&L.
53. Amendment to the 1988 ACO, NJDEP, May 4, 1994.
54. Group II Impoundments (1, 2, 15, 16, 17 & 18) CMS/FS Report, BB&L, May 1994.
55. Group I Impoundments (11, 13, 19 and 24) Remedial Design Report, BB&L, May 1994.
56. Final Renewed NJPDES/DGW Permit dated July 15, 1994, NJDEP, Effective September 1, 1994.
57. Remedial Action Plan for Impoundment 19, ENSR and BB&L, July 1994.
58. NJDEP Approval for Group II Impoundments (1, 2, 15, 16, 17 and 18), July 19, 1994.
59. September 16, 1994 Modifications to Remedial Action Plan for Impoundment 19, American Cyanamid.
60. Final Summary Report for Startup of Production Wells PW-2 and PW-3, CDM, August 1994.
61. Impoundment 7 Closure Status Report, BB&L, December 1994.
62. Superfund Update, December 1994, NJDEP.
63. January 30, 1995 letter from American Home Products (AHP) indicating that it has assumed full responsibility for the site remediation as required by the ACO.
64. Petition for Designation of Impoundment 8 as Corrective Action Management Unit (CAMU), February 21, 1995, AHP.
65. Lagoon 8 Closure Certification Report, BB&L, May 1995.
66. NJDEP letter dated May 3, 1995 to Walt Sodie of CRISIS including legal opinion (dated April 25, 1995) from the Deputy Attorney General's office concerning removal of Group II Impoundments (15, 16, 17 and 18) from Flood Hazard Area.
67. USEPA's response to AHP dated May 18, 1995 for CAMU Petition.
68. AHP's response to USEPA dated June 29, 1995 for May 18, 1995 letter concerning CAMU Petition.
69. October 20, 1995 letter from AHP including revised cost estimates for remediation of the Group II Impoundments (15, 16, 17 and 18).
70. Impoundment 19 Closure Certification Report, O'Brien & Gere, November 1995.
71. Superfund Proposed Plan for Group II Impoundments (15, 16, 17 & 18) and Hill Property Soils, NJDEP, January 1996.
72. Transcript for February 22, 1996 Public Meeting concerning the Proposed Plan for Group II Impoundments (15, 16, 17 and 18) and Hill Property Soils.
73. 3/27/96 Letter from OB&G concerning the supporting information for the Classification Exception Area at the Hill Property.

74. 5/10/96 Letter from AHP concerning Security Signs for Off Road Vehicles.
75. Record of Decision for Group II Impoundments (15, 16, 17 and 18), NJDEP, July 12, 1993.
76. Record of Decision for Hill Property Soils, NJDEP, July 12, 1993.
77. Impoundment 11 Remedial Action Plan, OB&G, August 1996.
78. Impoundment 8 Facility--Cell 2 Construction Completion Certification Report, OB&G, August 1996.

Remedial Design Report for Group II Impoundments (15, 16, 17 & 18), OB&G, March 1997.

80. Remedial Design Report--Remedial Action Plan for Impoundment 6 Closure, OB&G, August 1997.
81. Modified Site-Wide Ground Water Monitoring Program, AHP, September 1997.
82. Group III (1, 2, 3, 4, 5, 14, 20 and 26) Impoundments Corrective Measure Study/Feasibility Study (CMS/FS) Report, OBG, November 1997.

Revised Petition for designating Impoundment 8 as Corrective Action Management Unit, May 8, 1997, AHP.

12/4/97 letter from AHP amending cost estimates for remedial alternatives for Category A material of the Group III (1, 2, 3, 4, 5, 14, 20 & 26) Impoundments in the CMS/FS.

85. Impoundment 11 Closure Certification Report, November 1997, OBG.

86. Impoundment 8 Facility Basis of Design Report, OBG, March 1998.

Group III Impoundments (1, 2, 3, 4, 5, 14 & 26) Superfund Proposed Plan, NJDEP, April 1998.

Impoundment 18 Closure Certification Report, OBG, April 1998.

Site Assessment Report with Risk Assessment for Proposed Stadium Parking Lot Site, OBG, June 1998.

Transcript of May 21, 1998 Public Meeting for Group III Impoundments.

Appendix IV

**RESPONSIVENESS SUMMARY
TO THE
RECORD OF DECISION
FOR
GROUP III IMPOUNDMENTS AT AMERICAN CYANAMID SITE
BRIDGEWATER TOWNSHIP, SOMERSET COUNTY**

1. *Introduction*

A responsiveness summary provides a summary of comments and concerns received during the public comment period and the public meeting together with NJDEP's and the U.S. Environmental Protection Agency's (USEPA's) responses. All comments summarized in this document have been considered in NJDEP's and USEPA's final decision for the selection of a remedy for the Group III Impoundments (1, 2, 3, 4, 5, 14, 20 and 26) at the American Cyanamid Site.

2. *Outline*

This Responsiveness Summary is divided into the following sections:

- A. Overview
- B. Community Relations Activities
- C. Summary of Comments Received During the Public Meeting and Comment Period and Agency Responses
- D. Attachments

A. Overview

This is a summary of the public comments and concerns regarding the Proposed Plan for Remediation of the Group III Impoundments at the American Cyanamid Company Superfund Site and the NJDEP's responses to those comments. The comments that were received in writing are attached to this section.

The public comment period extended from April 22, 1998 to June 5, 1998 to provide interested parties the opportunity to comment on the Proposed Plan, Impoundment Characterization Program Final Report (ICPFR), Baseline Site-Wide Endangerment Assessment Report (Baseline EA) and the Corrective Measure Study/Feasibility Study (CMS/FS) for the Group III Impoundments at the American Cyanamid Company Site. During the comment period, the NJDEP and USEPA held a public meeting/public hearing on May 21, 1998 at the Bridgewater Township Municipal Court to discuss the results of the ICPFR, Baseline EA and the CMS/FS and to present the preferred remedy. This public comments period and meeting fulfills the public participation responsibilities of the Hazardous and Solid Waste Amendments of 1984 (HSWA) and 40 CFR Part 124 for a HSWA permit renewal.

On the basis of the information contained in the above referenced documents, NJDEP and USEPA have selected the following remedy for the Group III Impoundments (1, 2, 3, 4, 5, 14, 20 and 26) at the American Cyanamid Site:

Category A (High BTU Tar): Alternative A3 - LTTT
Category B (Low BTU tar/sludge): Alternative B3 - Bioremediation
Category C (Impoundment 3 material): Alternative C3 - LTTT
Category D (Non hazardous material): Alternative D4 - Consolidation in Impound 8
Category E (General Plant Debris): Alternative E2 - Consolidation in Impound 8

B. Community Relations Activities

Since 1988 there has been a great deal of concern about a proposal by American Cyanamid to build a commercial hazardous waste incinerator on the site. At present, Cyanamid has no plans to pursue the incinerator. The Somerset-Raritan Valley Sewage Authority already operates a sludge incinerator on property adjoining the American Cyanamid site. In addition, the Somerset County Freeholders designated a tract next to the Authority site for a trash incinerator, while this facility is no longer proposed, a solid waste transfer station is now in operation at this location.

In January 1989, a briefing for public officials and concerned residents was held in Bridgewater to discuss the remedial work under the 1988 ACO and the initiation of the Remedial Investigation/Feasibility Study (RI/FS). A public meeting was held on February 21, 1989 in Bridgewater to discuss the RI/FS. On both occasions, residents and local officials expressed concern and anger that they were bearing more than their fair share of society's waste cleanup burden. They made it clear that they did not want the Superfund remediation process to become a mechanism for Cyanamid to site a commercial hazardous waste incinerator.

Attendees at the January 1989 and February 1989 meetings also were confused about the remedial process at the site. The main cause of confusion is that some lagoon closures at the site are being handled under the Resource Conservation and Recovery Act (RCRA) because the Cyanamid plant is an operating facility. NJDEP representatives prepared a response to these concerns and forwarded it along with the RCRA response document to public comments received at the June 14, 1988 RCRA public hearing to those attending the January and February Superfund meetings. The subject of the June 14, 1988 RCRA hearing was the permitting of a permanent waste impoundment for storage of treated materials from the closure of other site impoundments.

NJDEP held a public meeting in Bridgewater on March 11, 1991 to provide an update on the progress of the RI. Residents and officials again expressed their opposition to any type of incineration at the site. Attendees at the meeting also raised concerns about the ongoing closure of the RCRA impoundments and the consolidation of these materials in the new Impoundment 8 facility. Concerns focused on the location of the new facility, safety of the liner and air pollution from ongoing site activities. NJDEP issued a fact sheet addressing these concerns in June 1991.

Resident's concerns at the American Cyanamid site have been focused through two local groups, CRISIS and the Bound Brook Citizens Association. In March of 1991, representatives of CRISIS expressed concerns regarding a proposed modification of a Hazardous Waste Facility permit to allow storage and blending of tars from lagoons 4 and 5. This permit modification was needed so that materials could be blended and heated for off-site shipment for use as alternative fuel in cement kilns. During the summer of 1991, Mayor Dowden of the Township of

Bridgewater and other local officials and residents publicly stated that NJDEP was working too closely with Cyanamid and keeping the township in the dark on site activities.

NJDEP representatives met with Mayor Dowden and other township representatives in Bridgewater to discuss these concerns and review the status of remedial activities on November 27, 1991. As a result of the November meeting, a representative of the Bridgewater Health Department was invited to attend monthly site remediation progress meetings, NJDEP reaffirmed its policy of placing site information in local repositories as soon as documents were completed and NJDEP offered to meet with township and community representatives before the start of major site activities.

In 1992, CRISIS received a Technical Assistance Grant (TAG) under the Superfund program from USEPA and hired a consultant to review and evaluate documents on the ongoing Superfund remedial program. On August 4, 1992, NJDEP held a briefing for local officials and representatives of CRISIS in Bridgewater to discuss the planned Surface Soils Remedial/Removal Action (SSR/RA) at the American Cyanamid Site. Township and CRISIS representatives were supportive of the surface soil work but asked for additional information on the health and safety plan for this project, which was provided before commencement of work. At the August 4th meeting, officials expressed concern about possible pollution of Cuckhold's Brook during the work and stated that the public was still not convinced that Cyanamid's ground water pumping system was controlling water pollution at this site. In an August 31, 1992 letter, CRISIS requested additional information from NJDEP on other site remediation issues including the development of the Risk Assessment document, health evaluations, construction of chemical processing plants as part of the cleanup process, and proposed ground water cleanup standards. NJDEP responded in a September 8, 1992 letter. NJDEP held a formal public comment period on the SSR/RA from September 17, 1992 through October 16, 1992. No additional comments on the SSR/RA were received during this period.

Representatives of NJDEP and USEPA visited the site with Congressman Robert Franks, Township officials and members of CRISIS on April 16, 1993. In response to concerns raised about remedial activities at the site by CRISIS representatives during this visit, NJDEP and USEPA offered, in an April 20, 1993 letter, to meet again with Bridgewater and CRISIS officials to address these concerns. NJDEP and USEPA did not receive any response from the Bridgewater and CRISIS officials.

NJDEP established information repositories at the following locations:

Bridgewater Town Hall
700 Garretson Road
Bridgewater, NJ 08807 Phone # (908) 725-6300
Somerset County/Bridgewater Library
North Bridge Street & Vogt Drive
Bridgewater, NJ 08807 Phone # (908) 526-4016

New Jersey Department of Environmental Protection And Energy
Bureau of Community Relations
401 East State Street, CN 413

Trenton, NJ 08625
Contact: Fred Mumford

Phone # (609) 984-3081

NJDEP held a briefing for public officials and concerned citizens in Bridgewater to discuss the corrective action portion of the 1988 Administrative Consent Order (ACO) and the initiation of the Remedial Investigation/Feasibility Study (RI/FS) (January 1989),

NJDEP held a public meeting in Bridgewater to discuss the RI/FS (February 21, 1989).

NJDEP prepared a Community Relations Plan (February 1989).

NJDEP forwarded information requested at the February 21, 1989 meeting to those attending (April 20, 1989).

NJDEP held a public meeting in Bridgewater to update the RI/FS progress (March 11, 1991).

NJDEP issued a Superfund Site Update fact sheet in response to concerns raised at the March 11, 1991 meeting (June 1991).

NJDEP met in Bridgewater with township officials to discuss concerns raised by Bridgewater regarding ongoing site activities (November 27, 1991).

NJDEP held a briefing in Bridgewater for officials and CRISIS representatives to discuss initiation of the Surface Soils Remedial/Removal Action (SSR/RA) (August 4, 1992).

NJDEP held a public comment period on the SSR/RA from September 17, 1992 through October 16, 1992.

NJDEP held a public comment period from June 30, 1993 through September 12, 1993 and a public meeting in Bridgewater on August 5, 1993 to discuss the Proposed Plan for Remediation of the Group I Impoundments and Modification of the Hazardous and Solid Waste Amendments Permit.

NJDEP issued a Record of Decision for the Group I (11, 13, 19 and 24) Impoundments in September 1993.

NJDEP issued a Superfund Update for the American Cyanamid site in December 1994.

NJDEP issued a Superfund Proposed Plan for the Group II Impoundments and Hill Property Soils in January 1996 and provided public comment period from January 10, 1996 to February 24, 1996.

NJDEP held a briefing with the Bridgewater Township officials and a public meeting on February 22, 1996 to discuss the Proposed Plan for the Group II Impoundments and Hill Property soils.

NJDEP signed Record of Decisions for the Group II Impoundments (15, 16, 17 & 18) and the Hill Property Soils in July 1996.

NJDEP issued a Superfund Proposed Plan for the Group III Impoundments in April 1998 and provided public comment period from April 22, 1998 to June 5, 1998. NJDEP held a public meeting/hearing on May 21, 1998 to discuss the Proposed Plan for the Group III Impoundments.

C. Summary of Comments Received in the Public Meeting and During the Public Comment Period and NJDEP Response

Comment: CRISIS and Bridgewater Township Health Department asked whether other options were considered for addressing general debris besides placement in the Impoundment 8 facility.

Response 1: Offsite disposal was screened out early in the feasibility study process for general debris because it was determined to be not cost-effective due to the requirements imposed by federal Land Disposal Restrictions (LDR) regulations.

Comment: CRISIS requested that the leachate from the Impoundment 8 facility be considered for pre-treatment before sending to the Somerset Raritan Valley Sewage Authority (SRVSA). CRISIS also raised concern regarding the wastewater treatment process at SRVSA containing volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs).

Response 2: SRVSA is discussing pre-discharge limits (prior to transfer of leachate from Impoundment 8 to SRVSA) with American Home Products Corporation (AHPC). For further information, please contact Glen Petruski, Executive Director of SRVSA at (732) 469-0593. American Home Products will comply with the discharge limits to be established by SRVSA for leachate from the Impoundment 8 facility. The waste water treatment process and subsequent discharge at SRVSA is regulated under the NJDEP's permitting program. This program is being overseen by the Northern Enforcement Bureau of NJDEP. For further information, please contact this program at (973) 299-7592.

Comment: CRISIS requested that it should be provided an opportunity to review design documents prior to their finalization for better input from the community.

Response 3: NJDEP will provide an opportunity to CRISIS to review design documents after preliminary review by NJDEP and USEPA prior to their finalization.

Comment: CRISIS requested that as a condition of CAMU designation, emission controls and rates be specified for placement of the treated material in the Impoundment 8 facility. CRISIS also requested that the same procedure be extended to the remedial activities to be performed throughout the Group III Impoundments.

Response 4: Air emission rates at the Impoundment 8 facility are being controlled through operational procedures (controlled placement of material, immediate placement and compaction vs. stockpiling, covering of the material following placement, etc.). These procedures are part of the operational requirements specified in the NJDEP approved design for the Impoundment 8 facility. These design requirements are part of the requirements of the Administrative Consent Order (ACO). Therefore, it is not necessary to re-specify these requirements as part of CAMU designation. Air monitoring is being performed at the Impoundment 8 facility on a regular basis. This air monitoring program is the same as was developed for Impoundment 19 remediation which was finalized after input from CRISIS.

Response 5: NJDEP agrees to extend the same air emission control and air monitoring program of the Impoundment 8 facility to the remedial activities to be conducted throughout the

Group III Impoundments. This will be done during the design phase. NJDEP will provide an opportunity to CRISIS to provide input during this phase.

Comment 6: CRISIS requested that a protocol should be developed and enforced to ensure and verify the requisite degree of control in the placement of these materials no closer than 2 feet from the liner material and away from the side slopes of the Impoundment 8 facility.

Response 7: This protocol has already been developed and being followed at the Impoundment 8 facility under the approved design as referenced in Response 4.

Comment: CRISIS requested that New Jersey Air Pollution Control regulations be specified as ARARs for materials in Categories B and C.

Response 8: NJDEP agrees with this comment. Detailed Evaluation Sections of Remedial Alternatives for Categories B and C of this ROD have been changed to reflect this. Detailed information related to this issue will be provided in the design. NJDEP will provide an opportunity to CRISIS to review the design report.

Comment: CRISIS requested that anaerobic low temperature thermal treatment (LTTT) should be eliminated from further consideration and only aerobic LTTT should be considered.

Response 9: In the Corrective Measure Study/Feasibility Study (CMS/FS), anaerobic LTTT was discussed in the context of operating at conditions, which approach incineration. This anaerobic LTTT process has been eliminated from further consideration. However, there are other anaerobic LTTT systems which do not operate at these conditions. Those systems may use steam or other inert gases (such as nitrogen) to provide anaerobic conditions. They can operate in the temperatures ranges of aerobic systems. In order to provide the most flexibility within the remedial design process such that most technically effective and cost-efficient technology is implemented, the specific LTTT technology to achieve the treatment objectives has not been specified in the ROD. It will be specified in the remedial design. NJDEP will provide an opportunity to CRISIS to review this design prior to its finalization. Selected Remedy section of this ROD has been revised accordingly.

Comment: CRISIS requested that the excavation of the Category B and C materials should be down to the seasonal high ground water table.

Response 10: There will be post-excavation soil sampling performed after removal of sludge and 6 inches of soil. If results are below the applicable criteria/standards, the impoundment will be closed. If the results are above the criteria/standards, the soils will be addressed as part of site-wide soil remediation program.

Comment: CRISIS requested NJDEP to expedite the schedule for subsequent remedial phases.

Response 11: Attached please find a copy of a schedule presented in the May 21, 1998 public meeting. The Administrative Consent Order does not require American Home Products Corporation (responsible party) to initiate the soil feasibility study until the remediation of the impoundments is complete. However, based on NJDEP's request, American Home Products Corporation has agreed to at least start evaluating different remedial technologies for the site-wide soils remediation. This may expedite the overall site remediation schedule.

Comment: A resident questioned the correctness of numbers listed on the slide presented during the May 21, 1998 public meeting.

Response 12: The presentation slide in question was a Summary of Operable Unit 1. There was a typographical error in the slide. Total volume of impoundment material was listed as 738,600 cubic yards. Instead, it should be 938,600 cubic yards.

Comment: A member of CRISIS requested information related to any potential effects of the rainwater runoff from the proposed commercial developments at the Hill Property area onto the main American Cyanamid site and surrounding areas.

Response 13: The main plant area of the American Cyanamid site is protected by a berm from flooding for up to a 100-year storm. As such, the main plant area should not have any impacts from the rainwater runoff from the proposed projects at the Hill Property area. Please note that the soils at the Hill Property area has been determined as not contaminated above the applicable criteria/standards. The rainwater/stormwater runoff from the proposed commercial projects at the Hill Property area would be subject to local regulatory requirements (Township Planning Board and Somerset County Soil Conservation District) as well as NJDEP storm water requirements. These requirements would prohibit any impacts of storm water from the site of the proposed projects to the surrounding areas.

Comment: A member of CRISIS requested information related to any potential impact of the proposed commercial projects on to the on-going pumping of at least 650,000 gallons per day (gpd) of contaminated ground water at the main American Cyanamid site. The same member also questioned the structural stability of the site of the proposed projects at the Hill Property area due to the pumping of ground water at the main American Cyanamid site.

Response 14: On-going pumping of the contaminated ground water at the main American Cyanamid site would not have any impacts from the proposed projects at the Hill Property area because the water is being pumped from the production wells located at the main site. Also, this pumping would not have any impacts on the structural stability of the site of the proposed projects because the water is being pumped from the bedrock formation at a depth of approximately 250 to 290 feet below ground surface.

Comment: A member of CRISIS asked about future regulatory oversight/monitoring by NJDEP and USEPA at the Hill Property area.

Response 15: Residual ground water contamination has been and will be monitored under NJDEP oversight until the results are below the applicable standards. After that, there will not be any oversight/monitoring by NJDEP and USEPA at the Hill Property area.

Comment: A member of CRISIS asked about the restriction of using contaminated ground water at the Hill Property area.

Response 16: As specified in the July 1996 ROD for Hill Property, a Classification Exception Area (CEA) and a Water Use Restriction Area (WURA) have been established to restrict the use of contaminated ground water at the Hill Property area. Once the ground water at the Hill Property area meet the applicable standards, the CEA and WURA will be lifted.

Comment: A member of CRISIS asked about the potential risk for building adjacent to a permanent toxic waste impoundment area.

Response 17: According to the 1992 Site-wide Baseline Endangerment Assessment, the American Cyanamid site does not pose any current or future risk to off-site locations.

Comment: A member of CRISIS asked whether the schedule of Somerset Patriots home games be considered before starting the low-temperature thermal treatment (LTTT).

Response 18: The LTTT is independent of the schedule for Somerset Patriots home games. Also, LTTT is not expected to have any impacts to any off-site areas. As such, the schedule of the Somerset Patriots home games will not be considered.

Comment: A member of CRISIS asked whether the cleanup at the American Cyanamid site will be completed in his lifetime.

Response 19: See Response # 9.

Comment: A member of CRISIS raised a concern about material handling and air emissions from remediation projects at the American Cyanamid site to the proposed projects at the Hill Property (specifically baseball field).

Response 20: See Response # 4.

Comment: A member of CRISIS raised a concern about potential impact of storm water runoff to the Raritan River and Cuckolds Brook.

Response 21: See Response # 11.

Comment: A member of CRISIS raised a concern about increase in traffic and trains, and light pollution related to the proposed projects at the Hill property area.

Response 22: NJDEP does not have any authority over the issues raised here. Please contact the Planning Board of Bridgewater Township for these concerns.

Comment: A member of CRISIS raised a concern about the overall remediation schedule with emphasis on the ground water remediation.

Response 23: See Response # 9 for the site remediation schedule. Contaminated ground water is already being controlled at the main plant area of the American Cyanamid site by the pumping of at least 650,000 gpd. This recovered water is subsequently being transferred to SRVSA for treatment. Control, recovery and subsequent treatment at SRVSA of the contaminated ground water from the American Cyanamid site is considered ground water remediation. This will continue until the sources have been remediated (impoundments and soils) and the applicable standards have been met for the ground water.

Comment: A member of CRISIS raised a concern about oversight for construction and monitoring during remedial activities.

Response 24: NJDEP has been and will be providing oversight for all remedial activities.

Comment: CRISIS raised a concern about finalization of the Natural Resource Damage (NRD) report.

Response 25: Bureau of Federal Case Management (BFCM) at NJDEP informed CRISIS in the past that the NRD aspect is being handled by NJDEP's Office of Natural Resource Damage (ONRD). Contact person there is Ms. Barbara Dietz Kantor, who can be contacted at (609) 777-

0242. BFCM faxed a copy of a comment letter dated June 17, 1998 (ONRD to American Home Products on NRD issues) to CRISIS on June 22, 1998.

Comment: A member of CRISIS requested information on site storm water before transfer to SRVSA. The same member also requested information concerning the treatment process at SRVSA.

Response 26: During the event of a major storm, site storm water at the American Cyanamid site is temporarily held at Impoundment 7 before transfer to SRVSA.

Response 27: See Response # 2 for further information on SRVSA. Also, during the public meeting, Mr. Chris Poulsen of the Bridgewater Township Health Department offered to provide the commentator detailed information on SRVSAs operation.

Comment: American Home Products Corporation submitted a comment letter stating that it would like to go on record for the following: On the basis of treatability work done to date, the preferred remedy for the Group III Impoundments cannot meet the Universal Treatment Standards (UTSs) specified under the Land Disposal Restrictions (LDRs). Furthermore, it is not known what, if any, the remedy can meet UTSs for the Group III Impoundments other than incineration. As such, Impoundment 8 facility must be designated as Corrective Action Management Unit (CAMU) to select and implement the proposed remedy for the Group III Impoundments.

Response 28: For the record, this comment is now part of the ROD.

Comment: Bridgewater Township Health Department (BTHD) requested to expedite the remediation schedule specifically for Impoundments 1 and 2 due to the concentration of contaminants detected.

Response 29: Remediation of Impoundments 1 and 2 will be prioritized within the Group III Impoundments, which would be detailed in the Remedial Design Report (RDR).

Comment: BTHD requested that any use of rotary kiln incinerators for LTTT should be excluded.

Response 30: Use of rotary kiln incinerators for LTTT has now been excluded.

Comment: BTHD requested that the site ground water monitoring program be expanded to cover the down-gradient area of Impoundments 1 and 2 while they are being remediated.

Response 31: NJDEP agrees with this comment. This will be done in the RDR.

Comment: BTHD requested that air emission control measures be specified in the RDR for Impoundments 1 and 2.

Response 32: See Response # 4.

Comment: BTHD requested that the RDR provide details on how the waste water generated during the remedial activities of the Group III Impoundments will be addressed.

Response 33: The RDR will provide this information.

Comment: BTHD questioned the proposal of placement of debris in the Impoundment 8 facility.

Response 34: See Response # 1.

Comment: BTHD requested information related to the status of NRD report.
Response 35: See Response # 23.

D. Attachments

The following documents are included as attachments to the Responsiveness Summary:

Written comments received during the public comment period;
Copy of a site remediation schedule as presented in the May 21, 1998 public meeting;
May 21, 1998 public meeting transcript.

Appendix V

GLOSSARY

RECORD OF DECISION GROUP III IMPOUNDMENTS AT AMERICAN CYANAMID SITE BRIDGEWATER TOWNSHIP, SOMERSET COUNTY

This glossary defines the technical terms used in this Record of Decision. The terms and abbreviations contained in this glossary are often defined in the context of hazardous waste management, and apply specifically to work performed under the Superfund program. Therefore, these terms may have other meanings when used in a different context.

Administrative Consent Order: A legal and enforceable agreement between NJDEP and the potentially responsible parties (PRPs). Under the terms of the Order, the PRPs agree to perform or pay for site studies or cleanup work. It may also describe the oversight rules, responsibilities, and enforcement options that the government may exercise in the event of non-compliance by the PRPs. This Order is signed by the PRPs and the state government; it does not require approval by a judge.

ARAR: Applicable or relevant, and appropriate requirements.

Berm: A ledge, wall, or a mound of earth used to prevent the migration of contaminants.

CAMU: Corrective Action Management Unit or CAMU means an area within a facility that is designated by the USEPA Regional Administrator under part 264 subpart S, for the purpose of implementing corrective action requirements under part 264.101 and RCRA section 3008(h). A CAMU shall only be used for the management of remediation waste at the facility.

Cap: A layer of material, such as clay or a synthetic material, used to prevent rainwater from penetrating wastes and spreading contaminated materials. The surface of the cap is generally mounded or sloped so water will drain off.

CERCLA: Comprehensive Environmental, Response, Compensation, and Liability Act of 1980, 42 U.S.C. 9601 et seq., as amended, commonly known as Superfund.

Closure: The process by which a landfill stops accepting wastes and is shut down under federal and state guidelines that provide protection for human health and the environment.

CMS/FS: Corrective Measures Study/Feasibility Study. A document that is used to develop a range of remedial alternatives and evaluate the alternatives with respect to regulatory criteria in order to select an optimal technical recommendation for site remediation.

Baseline EA: Baseline Endangerment Assessment. A site wide assessment that summarizes the risks posed to human health and the environment, under the assumption that no remedial activity has been conducted at the site.

Grubbing: Clearing the ground of roots and stumps by digging them up.

HSWA: Hazardous and Solid Waste Amendments.

LTFT: Low Temperature Thermal Treatment. A treatment technology in which organic chemicals are separated from a matrix (or medium) at relatively low temperatures .

NJDEP: New Jersey Department of Environmental Protection.

NCP: National Contingency Plan, 40 CFR part 300.

PPM: Parts per million.

RCRA: Resource Conservation and Recovery Act of 1976 as amended.

RCRA Cap: A multi-layer material cap (see definition of "cap" above) which incorporates several impermeable covers to assure absolute integrity. Geomembrane liners, filter fabrics, clay, sand and selected layers of fill materials are used to reach maximum reasonable impermeability.

SARA: Superfund Amendments and Reauthorization Act.

USEPA: United States Environmental Protection Agency.

Volatile Organic Compounds (VOCs): VOCs are produced as secondary petrochemicals. They include light alcohols, acetone, trichloroethylene, perchloroethylene, dichloroethylene, benzene, vinyl chloride, toluene, and methylene chloride. These potentially toxic chemicals are used as solvents, degreasers, paints, thinners, and fuels. Because of their volatile nature, they readily evaporate into the air, increasing the potential exposure to humans. Due to their low water solubility, environmental persistence, and wide-spread industrial use, they are commonly found in soil and ground water.

Wetland: An area that is regularly saturated by surface or ground water and, under normal circumstances, capable of supporting vegetation typically adapted for life in saturated soil conditions.